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THE IRON TRADE REVIEW

A Weekly Journal Devoted to the Machinery, Metal-Working and Foundry Trades, and Iron and Steel Manufacture.

VOLUME XXXVII. CLEVELAND, OHIO, AUGUST 11, 1904. NUMBER 32

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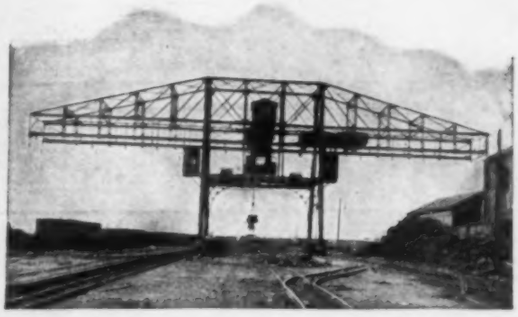

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THE IRON TRADE REVIEW

VOLUME XXXVII CLEVELAND, OHIO, AUGUST 11, 1904 NUMBER 32

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The deal by which the Pittsburg Steel Co. bought 110,000 tons of Bessemer pig iron and arranged with the Republic Iron & Steel Co. to convert it into steel has overshadowed all other developments in the iron trade the past week. Opinions as to the probable effect on the billet pool have been made much of, but no official action has been taken as yet. The fact that the contract is not so greatly different from that which the same interest made last year, both being based on the price of Bessemer iron, makes it less sensational in its probable effect than has been assumed in some quarters. What is significant about it is that steel will be delivered at Monessen in the next ten months at a cost to the buyer there $4.25 less than the delivered price of the billet pool, which is $23.50. This means the establishment of a new level for steel. No meeting of the association has been held in New York, as reported, but an investigating committee has had sessions at Pittsburg and some official action may result.

The effect of the transaction has been to add weight to buyers' expectations of lower prices for crude steel and finished products. If independent producers of sheets, tin plates, bars and wire products can duplicate the price fixed by last week's purchase, they can the better compete with the large producers in these lines. This condition means a close following of the market and no large commitments by consumers in any lines. As yet no formal announcements of new prices have come, but the tendency is naturally toward weakness. The appointed meeting of wire manufacturers was held at Chicago and the concession of $2 a ton that has been granted large jobbers in wire and wire nails for some time was made regular. It is believed the new official basis can be maintained in central territory, but the influence of the Colorado company, which is not a party to the agreement, will continue to be felt in the West.

Structural business that has been discussed for some time is coming to the contract stage. A Boston store calls for 5,000 tons. Bridge work for the Detroit Southern represents 2,000 tons. The Chicago elevated work for the South Side is about to be let and will require 22,000 tons, possibly 30,000, while the Duquesne elevated contract of the Pennsylvania road, 6,000 tons, will be awarded any day. The Lackawanna Steel Co. has taken 3,000 tons of structural shapes for Chicago work and its appearance as a bidder is of especial interest since it is not a member of the beam pool. At New York the renewal of building trades troubles promises to cut down considerably the steel erection projected for this year.

The rail situation is unchanged. Purchases by the Lehigh Valley and the Erie amount together to 8,000 tons. A contract for 15,000 tons of line pipe for Kansas is reported. That end of the business has been good all the year, but there is uncertainty as to merchant pipe, on which prices are still shaded. A meeting of independent manufacturers was held at Pittsburg this week but no formal action was taken. Merchant steel has been in fair demand at Chicago and bar specifications have improved with the expected starting up of agricultural machinery works. Slight cutting on steel bars is reported, principally by an independent Western plant.

The pig iron market has shown little actual change, though in the Mahoning and Shenango valleys sentiment has been better in view of recent business taken by merchant furnaces. Cincinnati reports a number of round lots sold—one of 10,000 tons of foundry and malleable, one of 5,000 tons to an Ohio foundry, deliveries extending into next year, and one of 5,000 tons to an Ohio pipe works. Ohio furnaces have sold at $11.75 at furnace for No. 2 foundry, and this has been shaded, while on the other hand there are makers holding for $12 at furnace. The most obvious fact about the foundry iron market is that even with the better buying of the past three weeks—less pronounced perhaps in the past week—there is still plenty of unsatisfied capacity in the North. Southern furnaces may continue to quote $9.50 at Birmingham for No. 2, but at that figure they will be debarred from a considerable section of the North. Central Western furnaces must be able to get 75c to $1.00 a ton more for their iron before Southern furnaces can be competitors on the $9.50 basis. It will require a marked increase in business to put the Northern pig iron market up 75 cents.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, Aug. 10.

The conversion contract taken by the Republic Iron & Steel Co. last week, which calls for the delivery of 110,000 tons of Bessemer billets to the Pittsburg Steel Co. in the next ten months, threatens to disrupt the billet association. A meeting was held in this city yesterday at which the matter was discussed, and further meetings are to be held this week. The investigation is made by a committee which has been meeting three times a week since the last general meeting of the association in New York, each concern being represented direct or by proxy. All reports of alleged irregularities are looked into at these meetings. Whether the conversion agreement entered into is a direct violation of the billet agreement is the point under discussion. It is alleged that any price or arrangement which would give a consumer steel below the agreed quotations is a violation of the agreement, and that the agreement was violated when the contract with the Pittsburg Steel Co. was accepted. On the other hand it is asserted that conversion arrangements are allowed, and while they violate the spirit of the agreement they do not do so directly. At present it is not known whether the market will be declared open. Several producers are in favor of breaking away from the association entirely, while others are doing everything in their power to apply a coat of white. There have been reports in the trade for many months of the flexibility of the billet association prices and it is generally believed that the elastic limit has about been reached. With independent manufacturers constantly taking business at from $1 to $2 below association prices or assenting to any kind of a reasonable conversion arrangement, the attempt of the leading producers to maintain the present fictitious basis is regarded as farcical.

On the strength of the Pittsburg Steel Co. contract efforts have been made during the week to boom the market in general, the boomers losing sight of the fact that this order does not mean any new business but that it is merely turning business from the United States Steel Corporation to another producer. To some extent it has strengthened the iron situation in the Mahoning and Shenango Valleys, but the extended delivery of this tonnage prevents the order from becoming any great immediate factor in the situation. Bessemer iron for prompt shipment can still be had at $12 at the furnace, while sales of 6,000 and 4,000-ton lots respectively have been made for delivery the last four months at this price in the past few days.

Much of this iron has gone to brokers, who are now holding for $12.25 while one concern is asking $12.50 at the furnace for the last quarter. Forge iron is held at $12 at the furnace while sales of Northern No. 2 have been made at $12.65 Pittsburg. TIhe demand for the two last named grades of iron is by no means heavy, the buying of foundry iron being limited almost entirely to small lots.

In finished lines the largest order of the week calls for 15,000 tons of line pipe taken by the National Tube Co. for a Kansas oil and gas line. This order was figured on by the pipe mills last December, but owing to adverse business conditions has been held up until this week. In merchant pipe the market is quiet, but the heavy demand for line pipe more than makes up this deficiency in demand. Quotations are being maintained despite the small demand, prices having reached a point where further cutting is unprofitable. The plate market continues quiet, widths up to 60 inches being shaded from $3 to $4 a ton. Wide plates which are only rolled by association members are held firmly at agreed quotations.

A meeting of the leading wire interests was held in Chicago last Thursday and Friday. All the leading interests, including the American Steel & Wire Co., Kelly Iron & Nail Co., Alabama Steel & Wire Co. and the Pittsburg Steel Co., and excepting the Colorado Fuel & Iron Co., being represented. During the past three months concessions ranging from $1 to $2 per ton have been granted to large jobbers, and the lowest prevailing quotation, which is a reduction of $2 a ton from the last official price, was named as the new base. With the fall demand coming on it is believed that this new price can be maintained, although the absence of the Colorado Fuel & Iron Co. from the meeting threatens trouble in the West. On iron cut nails concessions of $1 a ton are reported, and while the base is $1.75 to jobbers the prevailing price is $1.70 on both steel and iron.

The Detroit Southern railroad this week placed a contract with the American Bridge Co. for the erection of three bridges calling for about 2,000 tons of material, and Wm. Scaife & Sons, of this city, secured the contract for the erection of the new ordnance plant at Sharon, calling for 600 tons. The contract for the South Side Elevated in Chicago will be placed within the next two weeks, calling for about 22,000 tons of material, while specifications for the Duquesne elevated tracks of the Pennsylvania railroad are expected daily, calling for 6,000 tons.

Pig Iron.—The purchase of Bessemer iron by the Pittsburg Steel Co. will cause the resumption of a number of Valley stacks. The Claire furnace of M. A. Hanna & Co. is preparing to go in, while the furnace of the Youngstown Steel Co. was blown in this week. The Republic Iron & Steel Co. also expects to blow in its Hall and Hannah furnaces within a few days. The lowest price at which Bessemer can now be had is $12 at the furnace, and while brokers who have been buying heavily on speculation are trying to force the market up to $12.25 to $12.50, considerable $12 iron continues to be offered. On forge iron $12 Pittsburg can still be done, while sales of small lots of No. 2 foundry have been reported at $12.65 Pittsburg. One order for 1,000 tons of foundry will be placed by a leading interest within a few days. Several leading Southern interests have advanced prices on all grades below No. 2 25 cents a ton, making forge $8.75 Birmingham. On No. 2 foundry $9.50 is asked by nearly all the producers, although $9.25 might be done. On Aug. 1, of a total of 185 furnaces tributary to the Lake Superior ore region, and having a daily capacity of 53,600 tons, 100 were operative and 85 idle. The idle capacity amounts to 41 percent. Since July 1 the increase in the idle capacity is 6 percent. The following table shows the idle capacity thus far this year on the first of each month:

January	64½ percent	May	10½ percent
February	38 percent	June	20 percent
March	28 percent	July	35 percent
April	14½ percent	August	41 percent

From present indications a better showing will be made on Sept. 1, when the idle capacity promises to be about the same as that on July 1. We revise quotations as follows:

Bessemer, Valley	$12 00 to 12 25
Bessemer, Pittsburg	12 85 to 13 10
No. 1 Foundry	13 00 to 13 25
No. 2 Foundry	12 65 to 12 85
Gray forge, Pittsburg	12 00 to 12 15
Chilled basic, Valley	11 75 to 11 95
Chilled basic, Pittsburg	12 60 to 12 75

Steel.—Whether the billet association shall continue operative in its present form, or whether the market shall be declared open and a reorganization effected when the market has settled is the question now being considered by the leading steel producers. At a meeting of the investigating committee of that organization held in this city yesterday the conversion contract taken by the Republic Iron & Steel Co. was discussed, but no action has yet been taken. Agreed prices, which by no means represent the market, are as follows: Bessemer and open heart billets, 4 x 4 inches, and slabs up to and including 0.25 carbon, $23 Pittsburg, Wheeling, Valley, Johnstown, Ashland, Ky., Ironton, O., and Lorain, O.; 0.26 and including 0.60 carbon, $1 advance; and 0.61 to 1.00 carbon, $2 advance. Billets smaller than 3⅞ inches and sheets and tin bars are $1 per ton extra. Bessemer and open hearth rods are quoted at $28 to $28.50 Pittsburg.

Ferro-Manganese.—The demand continues light and domestic 80 percent is quoted at $41 to $41.50, delivered at buyer's mill in carload lots at any point east of the Mississippi. There is considerable demand for ferro-phosphorus, inquiries out calling for nearly 1,000 tons. Last sales were made at $55 per ton.

Muck Bar.—There is little demand and the market is held nominally at $24 Pittsburg.

Skelp.—Grooved steel skelp is held at 1.35c Pittsburg and sheared at 1.40c. Grooved iron is held at 1.42½c and sheared at 1.47½c. There is little buying.

Rails and Track Material.—New orders in standard sections are light, while the extremely low prices on light rails fail to tempt any large orders. Contracts for 25-pound rails have been taken as low as $20, despite the fact that standard sections are held at $28. To preserve the proper differential the 25-pound sections should be selling at $31 instead of $20. We make the following quotations: Standard sections, 50 pounds and over, in lots of 500 tons and over, $28; car lots and less than 500 tons, $30; less than car lots, $32; light rails, 16 to 40 pounds, $20 to $21. Track material, spikes, 1.60c to 1.65c.

Plates.—The market continues quiet and new business is light. On sizes up to 60 inches in width made by numerous mills outside of the plate association concessions ranging from $3 to $4 per ton are reported. Agreed prices are as follows: Tank plates, ¼ inch thick and up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.70c; marine, ordinary firebox, A. B. M. A. specifications, 1.80c; still bottom steel, 1.85c; locomotive firebox, not less than 2.10c, and it ranges in price to 3c. Plates, more than 10 inches, 5c extra 100 pounds. Plates 3-16 inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots with 5c extra a hundred pounds for less than carload lots. Terms, net cash in 30 days.

Bars.—There is very little shading on steel bars, prices being too low for any of the independent mills to pay association prices for billets and shade the agreed prices on the finished material. Specifications are somewhat heavier, but no great improvement is looked for until next month. The bar iron market continues quiet. We make the following quotations: Bar iron, 1.25c to 1.30c Pittsburg for local delivery, while for Western shipments quotations are based on 1.25c to 1.35c Pittsburg. Hoops are held at 1.55c base, and bands at 1.35c taking bar extras. Bessemer steel bars, 1.35c; open hearth, 1.40c; plow beams and cultivator beams, 1.35c net; channels, angles, zees and tees, Bessemer, under 3 inches, 1.45c. The following differentials are maintained on steel: Less than 2,000 pounds of a size, not less than 1,000 pounds, 10 cents advance; less than 1,000 pounds of a size, 30 cents advance.

Sheets.—The demand for sheets is improving slightly, and prices remain stationary. Our quotations on black sheets, one pass, are as follows: No. 8, 1.60c; No. 9, 1.56c; Nos. 12 to 14, 1.70c; Nos. 15-17, 1.75c to 1.80c; Nos. 18-21, 1.85c to 1.90c; Nos. 22-24, 1.95c; Nos. 25-26, 2c; No. 27,

2.05c; No. 28, 2.10c to 2.15c; No. 29, 2.35c to 2.40c; No. 30, 2.50c to 2.55c. Galvanized: Nos. 12-17, 2.20c to 2.25c; Nos. 18-21, 2.35c to 2.40c; Nos. 22-24, 2.50c to 2.55c; Nos. 25-26, 2.65c to 2.70c; No. 27, 2.90c; No. 28, 3.10c; No. 29, 3.45c to 3.50c; No. 30, 3.85c to 3.90c.

Structural Material.—The American Bridge Co. has been awarded the contract for the erection of three bridges for the Detroit Southern railroad, calling for about 2,000 tons. William Scaife & Sons have received the contract for the erection of the new ordnance plant at Sharon, calling for 600 tons. The contract for the structural material for the Chicago South Side Elevated will be placed in about two weeks, requiring 22,000 tons. The specifications for the Duquesne elevated tracks of the Pennsylvania railroad to be erected in this city are expected daily. About 6,000 tons of material will be required. While there are reports of shading of quotations on structural shapes, all the leading manufacturers deny that they are naming less than agreed prices. However, mills having their own structural fitting shops are in a position to name lower prices on fitted material than a fitting shop not connected with a steel plant. We make the following quotations: Beams and channels, 3 to 15 inches, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles, from 3 to 16 inches, 1.60c; universal mill plates, 1.60c.

Wire and Wire Nails.—A meeting of the leading wire and nail interests was held in Chicago last Thursday and Friday and prevailing prices which are $2 below the last official base were named as the new official basing card. All of the leading interests except the Colorado Fuel & Iron Co. were represented and trouble is threatened in the farther Western market where cuts have been deepest. On cut nails, while the official price is $1.75, the prevailing price for both steel and iron is $1.70. We revise quotations as follows: Wire nails, carload lots to jobbers, f. o. b. cars Pittsburg, $1.80 base; plain wire, carload lots, $1.70 base; barb wire, carload lots, $2.10 base; staples, carload lots, $1.95 keg. Galvanized 30 cents extra. Carload lots to retailers are held at 5 cents advance in all lines, and on less than carload lots a further advance of 10 cents is charged. Steel and iron cut nails, carload lots, $1.70, and less than carload lots, $1.75 f. o. b. Pittsburg, plus freight to point of destination. Terms, 60 days, less 2 percent off in 10 days.

Spelter.—The spelter market continues quiet and quotations are unchanged at 4.87½c to 4.88c, for prime Western grades in carload lots, delivered, Pittsburg.

Pipes and Tubes.—The National Tube Co. has been awarded a contract for 15,000 tons of line pipe by an independent Kansas oil and gas producer with headquarters in Pittsburg. Inquiries were out on this business last December, but owing to the adverse trade conditions it has only recently been placed. Demand for merchant pipe has fallen off to some extent, but prices are being maintained. Discounts to consumers, carload lots f. o. b. Pittsburg, plus freight to destination according to Tube Rate Book, are as follows:

MERCHANT PIPE.

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
⅛, ¼ and ⅜ inch	70	55	69	54
½ inch	73	63	72	62
¾ to 3 inches	78½	68½	77½	67½
3½ to 6 inches	77	67	76	66
7 to 12 inches	72½	57	71½	56
Extra strong plain ends, ⅛ to 8 inches	69	59	68	58
Double extra strong, ½ to 8 inches	60	50	56	46

MERCHANT BOILER TUBES, LESS CARLOADS, 22 FEET AND UNDER.

	Steel.	Iron.
1 to 1½ inch	48	43
1¾ to 2¼ inches	60	48
2½ inches	62	48
2¾ to 5 inches	68	55
6 to 13 inches	60	43

Merchant Steel.—The market in nearly all lines is quiet, although several large shafting orders for Southern mills have recently been taken by the leading local producer. We make the following quotations: Toe calk, 1.90c; carriage spring steel, 1.75c; tire steel, 1.55c to 1.60c; plow steel, 6 inches and under, 1.35c for Bessemer and open hearth; plow slabs, ¼ inch and heavier, 1.60c. Drawn and cold rolled shafting is held at 52 percent off in carload lots and 47 off in less than carload lots.

Old Material.—We note the sale of 1,000 tons of heavy melting stock at $11.50, gross ton, Pittsburg. Rerolling rails have been offered by leading railroad interests in large tonnages in the past ten days, one road having disposed of 1,200 tons at $11.50.

Coke.—On furnace coke for delivery during the present month $1.35 can still be done, but for delivery during the last four months $1.40 and $1.45 is quoted. One contract for 80,000 tons of furnace coke for delivery to next July was placed at a shade under $1.50. This is by far the lowest price yet named or such extended delivery. On foundry coke $1.80 to $1.85 is quoted, while a few producers are receiving more than $2 for their product. While a large number of ovens in the Connellsville region have been blown in during the past week, the banking of more than 700 more than balanced the ones put in blast. In the upper region 9,782 ovens are still idle while the lower region reports 1,125. This is an idle capacity of close to 40 percent. The production of the upper region during the week ending Saturday, July 30, amounted to 154,984 tons, while the lower region produced 54,098 tons.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BLOCK, Aug. 9.

A revival of Western industries for autumn is developing in some respects sooner than a year ago. Within the past week evidences of this coming activity have appeared. The implement builders are making active preparations to resume operations. The International Harvester Co. will start up some of its plants, it is said, either next Monday or the Monday following. Other though smaller institutions are getting in line for the same return to work at full schedule. These evidences are appearing in the metal trades by way of specifications of material on old contracts. The implement people have ordered their malleable castings, for instance, in large quantities and the malleable foundries are making preparations to run steadily. So, too, there have been placed large specifications for bars and other mill products for shipment in the near future.

It is a moderate kind of improvement, not at all sufficient to be to the complete liking of the sellers, but the general attitude of the producers' representatives is to take cheerfully whatever good things come their way and not to set stakes too high for the balance of the season. The preparations for activity noted above have been noticed more in specifications than in the placing of new contracts, yet there has been some new business. Several contracts for merchant steel have been closed. One lot of 1,500 tons of steel bars was sold to a car manufacturer and there are inquiries for smaller tonnages. Several orders for steel rails have been placed, one for about 2,500 tons, another for 2,000 tons and several for smaller tonnages, making an aggregate of about 7,000 tons, divided between Eastern and Western mills. And the inquiry for spikes and other track material is keen. The Western railroad companies are not understood to be doing much just now in the buying of new equipment, and perhaps the more or less uncertain crop outlook is one of the causes of the continued wait.

Prices for finished products are not entirely satisfactory to the producers, nor are they much more to the liking of the buyers. There is still some shading of quotations in steel bars, though iron bars have developed strength during the week. Orders for considerable tonnage at 1.32½c have been refused by mills and for a single carload or two 1.40c is now about the prevailing quotation. Old material continues to gain steadily though slowly.

Pig Iron.—The inquiry this week for pig iron is not quite so large and the outlook is therefore for somewhat diminished orders. But the past week has been fairly active, the buying being usually for moderate quantities, nothing equaling the 12,000-ton order placed several weeks ago nor the 3,000-ton Haskell & Barker order a little later. But in lots running down from about 1,000 tons there has been booked a nice business. Southern irons continue to exhibit strength. Some of the producers in the South

have notified Chicago connections that they do not care to accept anything under $9.75 at furnace for No. 2, though there is an abundance of iron still to be had at $9.50. The strike situation in the South seems to be contributing more than anything else to this firmness of temper among the furnace interests. This strength is scarcely duplicated in the North. Southern representatives note with some disquietude that they are no longer able to sell product in Ohio, because of the low prices at which Ohio furnaces are offering iron, $11.75 at furnace or less for No. 2 in the central part of the State. And the Ohio iron is getting well over into Indiana, also, because of the renewed aggressiveness of makers. Local irons are now enjoying their full share of the business that is going in this district, and those Western furnaces that recently adopted the policy of selling iron for future shipment at a graded advance by quarters are meeting with success. Some business is being placed for shipments running up to next summer. A little Southern iron may possibly be sold yet at $9.25, but on the general run of business $9.50 is bottom. Quotations follow:

Lake Superior Charcoal	$14 50 to 14 75
Northern Coke Foundry No. 1	13 75 to 14 00
Northern Coke Foundry No. 2	13 25 to 13 50
Northern Coke Foundry No. 3	12 75 to 13 00
Northern Scotch Foundry	14 50 to 15 00
Ohio Strong Softeners No. 1	14 50 to 15 00
Ohio Strong Softeners No. 2	14 00 to 14 50
Southern Coke Foundry No. 1	13 65 to 13 90
Southern Coke Foundry No. 2	13 15 to 13 40
Southern Coke Foundry No. 3	12 90 to 13 15
Southern Coke Foundry No. 4	12 65 to 12 90
Southern No. 1 Soft	13 65 to 13 90
Southern No. 2 Soft	13 15 to 13 40
Southern Gray Forge	12 40 to 12 65
Southern Mottled	12 15 to 12 40
Southern Silveries (4% to 6% Silicon)	14 85 to 15 85
Jackson Co. Silveries (8% to 10% Silicon)	17 80 to 18 30
Alabama and Georgia Car Wheel	18 85 to 19 35
Malleable Bessemer	13 50 to 14 00
Alabama Basic	13 15 to 13 40

Billets.—There are under consideration some transactions which involve a rather heavy tonnage of steel. Closing will perhaps be deferred until after the conference of the billet pool in New York this week. But the billet market in the West is scarcely active. Regular quotations for Bessemer and open hearth billets, 4 x 4 and larger up to .25 carbon, are $24; up to and including .60 carbon, $1 extra; over .60 carbon, $2 extra. Billets 3⅞ in. and smaller, and sheet and tin bars, $25. Open hearth billets from store, $1.30 per 100 pounds.

Iron and Steel Bars.—It is stated that for the recent order for Northern Pacific cars, the specifications for the material of which permitted either iron or steel bars, the latter have been purchased, an order for 1,500 tons of steel for that purpose being reported. It was taken at some concession from regular quotations by one of the independent mills. There is an inquiry for 400 tons of iron from a wagon concern and a fair amount of current new trade is reported. Perhaps the most encouraging fact about bars is that specifications for steel product are being placed for much larger quantities than in months. Resumption of a more active consumption is under way. Iron bars gain steadily in strength and 1.35c is now quoted as absolute bottom for lots of 100 tons. We quote Chicago delivery: Mill shopments, bar iron, 1.35c to 1.40c; soft steel bars, 1.51½c; soft steel angles, less than 3 x 3, 1.61½c; hard steel angles, 1.30c; hoops, 1.71½c. On lots from store we quote as follows: Bar iron, 1.75c base full extras; steel bars, 1.70c to 1.80c base, half extras; hoops, 2c to 2.10c rates, full extras.

Sheets.—Business proceeds in much the same way it has been going in months. There is no perceptible change in prices and the buying is usually for current wants, the tonnage called for being fairly good. We continue to quote for one pass, cold rolled, blue annealed sheets, mill shipments, Chicago delivery, as follows: Nos. 9 and 10, 1.77½c to 1.79½c; Nos. 11 and 12, 1.79½c to 1.86½c; Nos. 13 and 14, 1.86½c to 1.91½c; No. 15 and 16, 1.89½c to 2.01½c. On box annealed, one pass, cold rolled: Nos. 18 and 20, 2.01c to 2.06½c; Nos. 22 and 24, 2.06½c to 2.11½c; Nos. 25 and 26, 2.11½c to 2.16½c; No. 27, 2.16½c to 2.21½c; No. 28, 2.26½c to 2.31½c; No. 29, 2.41½c to 2.46½c; No. 30, 2.51½c to 2.56½c. Jobbers report a fair demand for both black and galvanized sheets from stock. Prices are without change, and we quote as follows: No. 10 and heavier, 2c to 2.10c; No. 12, 2.05c to 2.15c; No. 14, 2.10c to 2.20c; No. 16, 2.20c to 2.30c; No. 18, 2.30c to 2.40c; No. 20, 2.30c to 2.40c; No. 22, 2.35c to 2.45c; No. 24, 2.40c to 2.50c; No. 26, 2.50c to 2.60c; No. 27, 2.60c to 2.70c; No. 28, 2.70c to 2.80c; No. 29, 2.85c to 2.95c. Galvanized sheets are quiet, and we quote Pittsburg discounts, f. o. b. mill, 80 and 5 to 80 and 10. For shipments from local store, 75, 10 and 5 to 80 percent.

Structural Material.—Plain material is moving steadily to the country in small quantities but trade is confined almost entirely to that class of orders. Large requirements are not numerous. Prices are without change, and we quote carload lots, Chicago delivery, mill shipments, as follows: Beams and channels, 16 inches and under, 1.76½c; 18 inches and over, 1.86½c; universal plates, 1.76½c; angles, 3 x 3 and larger, 1.81½c; zees 1.76½c. On lots from store, we quote beams, channels and angles, 3 x 3 and larger, 2c; beams, 18, 20 and 24-inch, 10c extra; tees, 2.05c rates.

Plates.—There is little new business of an interesting description but specifications are ample to keep the local mill in operation. The lighter plates are reputed to be weak and business is limited. We quote "official" prices on carload lots, mill shipments, Chicago delivery, as follows: Tank steel, ¼ inch and heavier, 1.76½c; flange steel, 1.86¼c; marine, 1.90½c universal mill plate, 1.76½c to 1.81½c; 3-16-inch, 1.86½c; Nos. 7 and 8, 1.19½c; No. 9, 2.10½c; No. 10, 1.91½c; No. 11, 1.96½c; No. 12, 2.01½c. From store, we quote tank steel, ¼-inch and heavier, 2c; 3-16, 2.10c; No. 8, 2.15c; No. 10, 2.15c; flange steel, 2.25c, all f. o. b. warehouse.

Rails and Track Supplies.—Buying shows a slight improvement and the electric railways are furnishing most of the business. There have been placed within the past week several orders exceeding 2,000 tons each, some going to Eastern and some to Western mills. Track supplies are in brisk demand and quotations are steady. We quote, heavy sections, mill shipments, as follows: 500 tons and over, $28; less than 500 tons to carload lots, $30; less than carload lots, $32; second quality rails, $27; light rails,, $22 to $24; track supplies, f. o. b. Joliet mill, angle bars, 1.35c; spikes, first quality, 1.65c to 1.75c; track bolts, 3½ x ¾, with square nuts, 2.20c to 2.30c per 100 lb.; with hexagon nuts, 2.35c to 2.45c.

Merchant Pipe.—A distinct improvement in the demand for merchant pipe is noted. Consumers and dealers have deferred orders as long as possible and now that the season for consumption is past its zenith the orders are coming in more heavily. Prices are unchanged. We quote carload lots, mill shipments, random lengths, f. o. b. Chicago, as follows:

MERCHANT PIPE.

	Steel Pipe.		Guaranteed Wrought Iron Pipe.	
	Black. Percent.	Galv. Percent.	Black. Percent.	Galv. Percent.
⅛ to ¼ inch	68.35	53.35	67.35	52.35
⅜ inch	71.35	61.35	70.35	60.35
½ to 3 incues	76.85	66.85	75.85	65.85
3½ to 6 inches	75.35	65.35	74.35	64.35
7 to 12 inches	70.85	55.35	69.85	54.35

Boiler Tubes.—Tubes also are sharing in the better volume of business, current business developing perceptible gains. Prices are without change, and we quote carload lots, mill shipments, Chicago delivery, as follows:

BOILER TUBES.

	L. W. Steel. Percent.	C. C. Iron. Percent.	Seamless Steel. Percent.
1 to 1½ inch	46.35	41.35	52.35
1¾ to 2¼ inch	58.35	41.35	40.35
2½ inch	60.35	46.35	48.35
2¾ inch to 5 inch	66.35	53.35	Up to 4 inches.
6 to 13 inch	58.35	41.35	50.85

The following are the agreed discounts from store, Chicago:

	Steel.	Iron.	Seamless Steel.
1 to 1½ inches	42½	37½	40
1¾ to 2½ inches	52½	35	37½
2½ inches	55	37½	40
2¾ to 5 inches	62½	47½	47½
6 inches and larger	52½	35	..

Merchant Steel.—For weeks trade in merchant steel has been mainly a matter of specifying on old contracts. But

recently there have been concluded several interesting contracts for special shapes and the outlook of trade is bright. Prices are without change, and we quote carload lots, mill shipments, Chicago delivery, as follows: Spring steel, 1.90c; sleigh shoe, flat sizes, 1.56½c; concave and convex, 1.76½c; cutter shoe, 2.25c; smooth finished machinery steel, 1.76½c base; smooth finished tire, 1.71½c; plow steel, 2.20c and upward, according to quality; toe calk, 2.06½c base. Ordinary grades of crucible tool steel, 6½c to 8c; special tool steel, 12c up. Cold rolled shafting, 52 percent from list in carload lots, and 47 percent discount in less than carload lots.

Cast Iron Pipe.—There are no large orders to report, but what may be called the routine trade is making a tonnage that is quite satisfactory, when compared with earlier orders this season. The tone of the market is distinctly strong. We quote 4-inch water pipe, $25.50; 6-inch to 12-inch, $24.50; larger sizes, $24; gas pipe, $1 a ton higher.

Wire Products.—Mills generally are running light. There are no producers in the West that have not curtailed their output in recent weeks. But this is because it is the dull season of the year. Prices are nominally unchanged as follows, some shading being reported as usual: Wire nails, carload lots, $2.10; less than carload lots, $2.15; cut nails, carload lots, 1.80c to 1.85c; less than carload lots, 1.96½c; smooth wire, carloads, $2, and $2.05 for less than carload lots; galvanized smooth wire, $2.30 in carloads and $2.35 in lesser amounts; painted barb wire, $2.40 carloads, and $2.45 in less than carload lots; galvanized barb wire, $2.70 carloads, and $2.75 less than carload lots. Staples, polished, carloads, $2.25; less than carload lots, $2.30; galvanized, $2.55 carloads and $2.60 less than carload lots. Bale ties, 82½ and 5 percent discount f. o. b. Waukegan, Ill., on straight carload lots. Poultry netting, 85 and 5 percent discount from list f. o. b. Joliet or DeKalb, with actual freight allowed not exceeding 50 cents per 100 pounds.

Foundry Coke.—Some renewed interest in coke is developing. Recent experiences of buyers and consumers have been that some premeditation in getting the fuel is desirable, for the stocks on track at Chicago are not large. No seller seems willing to risk any great chance in getting rid of unsold coke. The demand is slightly increasing and prices are firm, Connellsville grades being quoted $1.85 to $2.

Old Material.—What is reputed to be a demand from dealers themselves for scrap widens slightly this week and consumers are more disposed to take in a little material. The tone of the market is still strong and prices average up a little higher than a week ago. But it is not an altogether safe market for the dealer, who buys the offerings of the railroad companies and other large producers, for the demand for this scrap is still sufficient from the dealers themselves to make it difficult to sell immediately to a consumer at a profit. We quote dealers' selling prices, gross tons, as follows:

Old iron rails	$15 00 to 16 00
Old steel rails (4 feet and over)	11 00 to 11 50
Old steel rails (less than 4 feet)	10 00 to 10 50
Relaying rails, subject to inspection	21 50 to 22 50
Relaying rails for sidetracks	18 00 to 20 00
Old wheels	11 00 to 11 50
Heavy melting steel	9 50 to 10 00
Mixed country steel	7 00 to 7 50

The following quotations are for net tons:

Low phosphorus scrap (.04 and under)	$12 00 to 13 00
No. 1 R. R. wrought	11 00 to 11 50
No. 2 R. R. wrought	9 50 to 10 00
Shafting	12 50 to 13 00
Dealers' Forge, No. 1	8 00 to 8 50
Wrought pipe and flues	7 50 to 8 00
No. 1 cast, 150 lb. and less	9 50 to 10 00
Heavy cast	8 00 to 8 25
No. 1 mill	6 00 to 6 50
Country sheet	5 00 to 5 50
No. 1 boilers, cut	7 50 to 8 00
Boiler punchings	9 00 to 9 50
Iron car axles	15 00 to 16 00
Steel car axles	13 50 to 14 00
Iron axle turnings	7 00 to 7 50
Steel axle turnings	7 00 to 7 50
Cast borings	4 00 to 4 50
Mixed borings, etc.	4 00 to 4 50
Wrought turnings	7 00 to 7 50
Machine shop turnings	7 00 to 7 50
Railroad malleable	8 25 to 8 75
Agricultural malleable	7 75 to 8 00
Stove plate and light cast scrap	7 50 to 8 00
Old iron splice bars	13 00 to 13 50

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING, Aug. 10.

Iron Ore.—The ore shipments for July were somewhat disappointing, as they show a loss of 191,879 tons compared with July, 1903. The total shipments of Mesabi ores exceed those of July of last year, but the old range shipments show a considerable decrease. There were no shipments last month from Gladstone and will be none during the remainder of the season. The decrease for the season as compared with 1903 to Aug. 1 is 6,721,231 tons. The steel corporation, to a greater extent than ever before, is pursuing the policy of shipping ore over its own railroads and to ports where it has its own handling machinery. Hence Conneaut made an exceptionally good showing in ore receipts. About two-thirds of all shipments were by the corporation. It is understood that no unsold ore is being shipped. The shipments in July were as follows:

	1903	1904
Escanaba	733,866	671,496
Gladstone	10,475	.....
Marquette	367,560	319,558
Ashland	499,385	376,965
Superior	688,154	756,268
Duluth	913,304	923,811
Two Harbors	876,970	847,737
Total	4,087,714	3,895,835

The shipments to Aug. 1 were as follows:

	1903	1904
Escanaba	2,144,568	986,552
Gladstone	25,942	480
Marquette	1,040,564	451,838
Ashland	1,434,064	578,926
Superior	2,081,981	1,109,199
Duluth	2,745,845	1,283,829
Two Harbors	2,852,659	1,193,588
Total	12,325,643	5,604,412

The increased sale of ore noted last week has not continued and the market is again very quiet. Freight rates are unchanged and while it is probably true that lower freights might be obtained, shippers are not disposed to break the current rates, as it would force to the docks vessels which might be needed later in the season, when they would not be disposed to go again into commission for uncertain returns.

Pig Iron.—Improvement continues, being shown both in firmness of prices and in increased demand. One large consumer in north-central Ohio who purchased 3,000 tons late last week on quotations made in the previous week is understood to have paid $11.75 to $12 for Northern at furnace and about $9.25 for No. 2 Southern, Birmingham, the order being for 1,900 tons Northern and 1,100 tons Southern. Very little Northern can now be purchased at less than $12 at the furnace and sellers are not disposed to quote beyond Jan. 1. Southern iron at present prices, $9.25 to $9.50 Birmingham for No. 2, does not attract many buyers. The principal Southern producer is practically out of the market. We quote as follows for Cleveland delivery:

Bessemer	$12 60 to 12 75
No. 1 Strong Foundry	12 85 to 13 00
No. 2 Strong Foundry	12 60 to 12 85
No. 3 Foundry	12 25 to 12 50
No. 2 Southern	13 10 to 13 35
Gray Forge	12 15 to 12 25
Gray Forge, Southern	12 00 to 12 15
Lake Superior charcoal	14 25 to 14 75

Finished Material.—The principal topic of discussion has been the sale of 110,000 tons of billets on a conversion deal. The view generally taken is that the arrangement is a substantial violation of the agreement on billets, but it is not expected that there will be a disruption of the pool, for the reason that the principal manufacturers do not believe that such action would bring out enough business to justify it. The shaky condition of the billet pool is, however, emphasized, and if the transaction of last week is an infraction of the agreement it is only repeating on a large scale what has been done in a smaller way for months. The effect on the general market has not been good and improvement in finished material is not reported except

by some jobbers, who are doing a very satisfactory business from stock. Billets can, it is reported, be bought at $21.50. There has been a good inquiry for bar iron. Prices range from 1.25c to 1.30c at the mill. Steel bars at 1.44½c Cleveland for Bessemer and 1.49½c for open hearth are very quiet. Some cutting by an independent Western mill is reported. Agricultural interests have been in the market for sheets and the demand is somewhat stronger, but low prices are still being made by independent producers. The prices of the principal producers through jobbers are as follows, Cleveland delivery, the freight from Pittsburg being 9½ cents: Mill sales of black sheets in carload lots, No. 10, 1.74½c; No. 11-12, 1.79½c; No. 14, 1.84½c; No. 16, 1.94½c; No. 27, 2.19½c; No. 28, 2.29½c. Galvanized, mill sales, No. 14, 2.29½c; No. 16, 2.39½c; No. 18-20, 2.54½c; No. 22-24, 2.69½c; No. 25-26, 2.89½c; No. 27, 3.09½c; No. 28, 3.29½c. Black sheets out of stock: ¼ in., 1.90c; 3-16 in., 2c. Blue annealed: No. 10, 2.05c; No. 12, 2.10c; No. 14, 2.15c; No. 16, 2.25c. One pass cold rolled: No. 18-20, 2.35c; No. 22-24, 2.40c; No. 26, 2.45c; No. 27, 2.50c; No. 28, 2.60c; No. 30, 3c. Galvanized out of stock: ¼ in., 1.90c; 3-16 in., 2c. Blue annealed, No. 10, stock: No. 16, 2.60c; No. 18-20, 2.70c; No. 22-24, 2.85c; No. 26, 3.05c; No. 27, 3.25c; No. 28, 3.45c; No. 30, 4.25c.

Old Material.—The demand has improved, but buyers consider that recent quotations are high enough and they are not placing orders freely. Dealers who recently bought for speculative purposes are holding their scrap and the volume of business being transacted is small. Prices are not quotably higher. We quote as follows, gross tons:

Old iron rails	$14 50 to 15 00
Old steel rails (over 6 feet)	12 00 to 13 00
Old steel rails (under 6 feet)	11 00 to 12 00
Old car wheels	10 00 to 11 00
Steel boiler plate	9 00 to 10 00
Malleable iron (railroad)	9 50 to 10 00
Malleable iron (agricultural)	8 00 to 9 00
Heavy steel	9 50 to 10 50

We quote as follows, net tons:

No. 1 R. R. wrought	$10 00 to 11 00
No. 1 busheling	9 00 to 9 50
No. 1 machine cast	9 50 to 10 50
Iron axles	15 00 to 16 00
Axle turnings	7 00 to 8 00
Wrought turnings (free from cast)	6 00 to 6 50
Grate bars	7 00 to 8 00
Pipes and flues	8 00 to 8 50
Tank iron	7 50 to 8 50
Hoop and band iron	5 00 to 5 50
Sheet iron	4 00 to 5 00
Wrought drillings	6 00 to 6 50
Stove plate	7 50 to 8 00
Steel axles	13 00 to 14 00
Cast borings	3 50 to 4 00

CINCINNATI.

August 9.

The coke market is slightly improved in tone. There is less disposition on the part of the operators to make concessions to effect sales and there is more inquiry. Prices still have a wide range and $1.80 up to $2.10 f. o. b. ovens in the Connellsville district are still current as quotations for foundry coke.

Pig Iron.—There has been another week of fairly good buying. Most of the tonnage placed, however, has gone to Northern furnaces. Southern furnaces are still maintaining recent quotations, and some are advancing prices. Some Southern irons are still obtainable at $9.25 Birmingham, but the asking price is mainly $9.50 Birmingham for No. 2 as a basis. One of the large interests has advanced No. 3 foundry to $9.25, No. 4 to $9, and gray forge to $8.50. The recent Mansfield, O., inquiry has been disposed of and all of the Southern iron wanted was purchased from one company, amounting to 1,100 tons. An Eastern manufacturer has bought 10,000 tons of foundry and malleable iron, an Ohio manufacturer 5,000 tons of Northern foundry iron for deliveries extending into next year, and an Ohio pipe maker bought 5,000 tons Northern iron by analysis—deliveries through the balance of the year. A sale of 1,000 tons of Southern foundry was made for delivery at Indianapolis. A sale of 1,000 tons standard Bessemer is reported. There are several inquiries in the market covering deliveries beginning in October and running into next year. These are for from 500 tons to 1,500 tons and call for both Northern and Southern brands. A good inquiry for basic is reported. A fair run of inquiries for foundry grades in smaller lots is also noted, indicating that the increased demand which has been noticed for the past few weeks is keeping up. Southern furnaces seem to be indifferent to the encroachments made by their Northern competitors into what might be regarded as common territory. Their position seems to be a disinclination to use up ore and coal and put it into iron at unprofitable prices. Northern furnaces are now selling at less than $12 furnace for No. 2 and have even gone in some cases in the recent past to $11.50 in their eagerness for business. It is pointed out by some in the trade that instead of Birmingham prices furnishing a gauge for the level of values, Northern furnace prices are becoming more and more the dominant factor. It is pointed out that $12 Ohio furnace and $9 Birmingham are corresponding figures based on present freight rates. We find, however, Northern iron at $11.75 furnace and Southern iron mainly at $9.50 Birmingham, which results in prohibiting the sale of Southern iron in about 50 percent of the Northern consuming territory. We have noted increasing demand, but it seems clear that before Southern iron can again assume an important position in the markets of the North, particularly in Ohio, consumption must first absorb the Northern furnace stocks and enable Northern furnaces to advance prices about $1 per ton. It is reasonable to assume that in this event a large proportion of the now idle furnaces in the North will again go into blast and the demand will have to be sufficient to absorb that increase in production before Southern iron in quantities can find its way into Northern furnace territory. In the meantime about 40 percent of the Southern furnace capacity is idle but indications are that there is a tendency to increase production. The new Battelle furnace will start up shortly, the La Follette furnace is making more iron and is undergoing repairs and two important furnace interests are said to have adjusted their differences with the miners and will blow in again. This review of the situation leads to the conclusion that the market is stronger more on sentiment and firm holding than by reason of a better relation of actual demand and supply. It is, however, true that the tone of the market is better and that consumers are regarding present prices as probable minimum for some time. We quote in carload lots f. o. b. Cincinnati:

Southern Foundry No. 1	$12 50 to 12 75
Southern Foundry No. 2	12 00 to 12 25
Southern Foundry No. 3	11 50 to 12 00
Southern Foundry No. 4	11 00 to 11 25
Southern Foundry No. 1 soft	12 50 to 12 75
Southern Foundry No. 2 soft	12 00 to 12 25
Gray Forge	11 00 to 11 25
Northern Foundry No. 1	13 40 to 13 65
Northern Foundry No. 2	12 90 to 13 15
Southern car wheel iron	16 25 to 16 50

Finished Material.—The tone of the market is steady and the demand holds up fairly well. There is a better movement than in June and while nothing in the way of large business is to be noted there is an encouraging run of orders fully up to the measure of the recent increase in demand. Prices are hardening to some extent and there is less inclination to urge sales. Bar iron is still quoted at 1.40c and is regarded as steady at that quotation. Steel bars are quoted at 1.48c, half extras, with dealers quoting 1.75c to 1.90c for iron and steel out of store. Galvanized sheets are being quoted at 75 and 10 to 75, 5 and 2½ percent off. We quote black sheets, No. 27, at 2.30c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.70c; No. 27, 2.60c; No. 16, 2.35c; No. 14, 2.25c; No. 12, 2.16c; No. 10, 2.05c. Tank plates are dull and sell out of store at 2c for ¼-inch and 2.10c for 3-16-inch. Beams and channels are quoted at 2c from stock and angles at 1.90c to 2c for base sizes.

Merchant Pipe.—In merchant pipe there is an easy tone and it is intimated that the leading interest is considering a further reduction in the schedule which will place its prices nearer to the quotations of the independent mills. Boiler tubes are only quoted on application with specifications. We quote in carload lots f. o. b. Cincinnati:

MERCHANT PIPE.
(Basing Discounts.)

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Guaranteed Wrought Iron Pipe. Black. Percent.	Guaranteed Wrought Iron Pipe. Galv. Percent.
⅛, ¼, ⅜ inch	68.7	53.7	67.7	52.7
½ inch	71.7	61.7	70.7	60.7
¾ to 3 inch, inclusive	77.2	67.2	76.2	66.2
3½ to 6 inch, inclusive	75.7	65.7	74.7	64.7
7 to 12 inch, inclusive	71.2	55.7	70.2	54.7

BOILER TUBES.

	Steel Percent.	Iron Percent.
to 1½ inch	41.2	37.7
1¾ to 2¼ inch	54.2	36.7
2½ inch	56.7	41.7
2¾ to 5 inch	63.2	49.2
6 to 13 inch	54.2	36.7

Old Material.—There is a better feeling in the market. There is some inquiry for old railroad wrought and the price has been advanced on that article. On other descriptions there is not much change and it is still a dealers' market on most of the list. We quote:

Old No. 1 railroad wrought, net tons	$11 00 to 11 50
Cast machine and foundry, net tons	9 50 to 10 00
Old iron rails, gross tons	12 50 to 13 00
Old steel rails, gross tons	9 50 to 10 00
Old short lengths, gross tons	10 00 to 10 50
Old iron axles, net tons	13 50 to 14 00
Stove plate, net tons	6 00 to 6 50
Wrought turnings, net tons	6 00 to 6 50
Cast borings, net tons	3 00 to 3 50

James A. Green, Matthew, Addy & Co., has returned from a several weeks' vacation at Georgian Bay.

The offices of the Dayton Coal & Iron Co. have been removed to the new First National Bank building, which is a more central location and one of the finest office buildings in the city.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., Aug. 9.

Pig Iron.—The market during the past week was a little slower than for the week previous. Sales fell off, and inquiries were not as numerous either. There was no special feature unless it was the firmness in Southern irons. At this writing Southern No. 2 foundry is being strongly held at $9.50 Birmingham. There was a further falling off in the demand for Southern brands. Purchases are mostly confined to small lots, and a 100 or 200-ton order was made much of. Southern sellers show no disposition to seek business at present prices, being convinced that when a change in the market does occur it will be in the direction of higher prices. Northern brands were not as vulnerable during the week as they have been for several weeks previous. One reason is that the demand has not been as brisk as recently. An order for a round lot will still bring concessions, however. The buying nowadays calls, for the most part, for delivery within thirty days. Rarely does it go beyond ninety days, and only occasionally are sales made where delivery runs to the remainder of the year. Consumers are carrying light stocks and are reluctant to increase them until the outlook for the general business situation is brighter. It is expected that the remaining 54,000 tons of castings for the East River Pennsylvania tunnel, as well as the pig iron for these castings, will be placed in the very near future. New York pig iron quotations at tidewater follow: Northern No. 1 X, $14.50 to $15; No. 2 X, $14 to $14.50; No. 2 plain, $13.50 to $14; Southern No. 1 foundry, $13.50 to $13.75; No. 2 foundry, $13 to $13.25; No. 3 foundry, $12.50 to $12.75; No. 4 foundry, $12 to $12.25.

Rails.—The situation is quiet. Two small contracts have been closed in the week—5,500 tons for the Lehigh Valley and 2,500 tons for the Erie.

Finished Iron and Steel.—An interesting feature of the week in structural shapes was the coming into the market of leading Western roads, which had announced themselves as out of the market for this year. Their aggregate purchases were small, but there is a feeling that these may be the forerunner of more extensive business. The contract for the building of the new Henry Siegel dry goods store in Boston has been let. This means an order for about 5,000 tons of steel in the near future. Yesterday the bids went in for the elevated railroad extension in Chicago, mention of which was made last week. The work will call for at least 22,000 tons, and may possibly run up to 30,000 tons. The building strike in this city, structural makers believe, is likely to result in some important propositions hereabouts being at least deferred, if not withdrawn. Plates show no new features, current business being light. Sheets are very quiet, with prices irregular. Bars are without particular interest. New York prices are as follows: Beams and channels, 15-inch and under, 1.75c to 1.90c; angles, 3 to 6 inches, 1.75c to 1.90c; zees, 1.75c to 1.90c; bulb angles, 2.05c to 2.35c; deck beams, 2.05c to 2.35c; sheared steel plates, tank, 1.74½c to 1.80c; flange, 1.84½c to 1.90c; firebox, ordinary, 1.94½c to 2c; refined iron and soft steel bars, 1.49½c; sheets, in carload lots New York, No. 28, black, 2.30c to 2.35c; galvanized, 3.30c to 3.35c.

Old Material.—Trade has been very light during the past week. It is a waiting market, and materials only change hands when conditions render it unavoidable. Asking prices are very irregular, with a decided upward tendency. This is especially true of material which is in demand, such as heavy steel scrap, and cast iron wheels, in which holders confidently look for advances in the near future. Prices per gross ton, f. o. b. cars, follow:

Old iron rails	$14 00 to 14 50
Old steel rails, long lengths	11 75 to 12 50
Old steel rails, short pieces	11 00 to 11 50
Relaying rails	19 00 to 20 00
Old car wheels	11 50 to 12 50
Old iron car axles	17 00 to 18 00
Old steel car axles	14 00 to 14 50
Heavy melting steel scrap	11 50 to 12 00
No. 1 railroad wrought scrap	11 50 to 12 00
Iron track scrap	10 50 to 11 00
Wrought pipe	7 75 to 8 25
Ordinary light iron	4 50 to 5 25
Cast borings	3 50 to 4 00
Wrought turnings	5 50 to 6 00
No. 1 machinery cast	9 00 to 10 00
Stove plate	7 50 to 8 25

PHILADELPHIA.

August 9.

The demand for pig iron has improved slightly, but prices have not advanced. The outlook is more hopeful, but no decided change can be noted. July was one of the dullest months experienced by the trade in years. Railroads continue their economical policy and their purchases of equipment are very limited. General conditions indicate a steadier, if not a higher, market.

Pig Iron.—There is more inquiry and some improvement in business, but buyers still hesitate. Prices are fairly firm. We quote as follows: No. 1 X foundry, $14.75 to $15.25; No. 2 X foundry, $14.25 to $14.50; No. 2 plain foundry, $13.50 to $13.75; Standard gray forge, $13 to $13.25; ordinary gray forge, $12.50 to $12.75; basic, $12.90 to $13.10.

Finished Material.—Plate and structural mills have had a fairly good week, but orders were not large. Bar trade is dull. Rumors of cutting are current in nearly all lines, but official quotations continue as follows: Beams, channels and angles, 1.73½c to 1.85c, according to specifications, and small angles, 1.50c to 1.55c. Plates, 1.73½c for ¼-inch, with the usual advance on extras. Bars, 1.48½c and upward, for either steel or refined iron.

Old Material.—There is more inquiry, but sales are light. Prices show little change. We quote as follows: No. 1 steel scrap, $11.50 to $12; low phos. scrap, $16 to $16.50; old steel axles, $14.50 to $15; old iron axles, $17.50 to $18; old iron rails, $13.75 to $14.50; old car wheels, $10.50 to $11; choice railroad No. 1 wro't, $13 to $13.50; machinery cast, $11.50 to $12.25; No. 2 light scrap (forge), $9 to $9.50; No. 2 light scrap (ordinary), $7.50 to $7.75; axle turnings, $9 to $9.50; wrought turnings, $8.50 to $9; cast borings, $6 to $6.50; stove plate, $8.50 to $9.25; wrought iron pipe, $9.50 to $10.

BIRMINGHAM, ALA.

BIRMINGHAM, Ala., Aug. 8.—Pig iron production is yet greatly curtailed, though it is announced that during the present week there will be a resumption of work at the three furnaces of the Alabama Consolidated Coal & Iron Co. The Tennessee Coal, Iron & Railroad Co. will shortly relight fires in its Oxmoor furnaces, and there is talk of one or two of the Bessemer (Ala.) furnaces being started up again in the near

future. The Woodward Iron Co. signed the temporary wage contract with the miners some time since, but has not been operating its mines on account of the demand for the collection of $1 per man per week for the strike fund of the organization. It will resume operations at the two furnaces at Woodward in the near future.

The strike of the Alabama union miners appears to be no nearer the end. During the last part of the past week the Alabama Consolidated Coal & Iron Co. signed the temporary wage contract with the miners, the same contract as was in existence up to July 1, and there has been a resumption of work at its mines. The other furnace companies say they will hold out longer against the demands of the union miners. While nothing definite is mentioned, it is learned that the companies whose mines are still idle intend making a concerted effort this week to start up their colleries with such labor as desires to work, union or non-union, offering a minimum wage of 45 cents per ton, against 47½ cents demanded by the union. The Republic Iron & Steel Co. has two furnaces ready for operation at Thomas just as soon as coal supplies are sufficient to warrant their being blown in. This company is purchasing coal from the Sayre Coal & Mining Co., a non-union labor concern, for the one furnace in blast. The Sloss-Sheffield Steel & Iron Co. and Tennessee Coal, Iron & Railroad Co. both have several mines in operation with convict and non-union labor.

Pig iron prices in this district are firm, No. 2 foundry still being held at $9.50. More than one company appears to be easy in the matter of orders, having sales books filled for a short period anyway. The sales reported lately have been a little heavier than the average, several lots of from 500 to 1,500 and 2,000 tons being noted.

J. C. Maben, president of the Sloss-Sheffield Steel & Iron Co., recently discussing the cost of pig iron making in this district, dwelt at some length on the cost of coke, showing cost sheets from the furnace manager of his company. The cost of coke for a ton of iron is figured at more than $4.

Sixteen coke furnaces are still in operation in this State, with five of them making basic iron. One furnace is making charcoal iron.

The Bessemer rolling mill (Tennessee Coal, Iron & Railroad Co.) is still operating the bar and plate mills with non-union labor. The management states that the operation of the plant is successful.

The Metal Market.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., Aug. 9.

Pig Tin.—The market during the week showed a receding tendency, and present prices are about ⅜c lower than those previously quoted. Trade is very light, with the outlook not very promising, conditions which bearish operators are utilizing in their operations. The London market during the week has been very feverish, and prices have declined considerably, especially in spot. Today's closings follow: Spot, 26.72½c to 26.82½c; August, 26.70c to 26.80c; September, 26.65c to 26.75c. London's closings today follow: Spot, £121 12s 6d; futures, £122 2s 6d. Arrivals for the month to date amount to 1,140 tons, with 2,629 tons afloat.

Copper.—Outside of prices being a trifle easier, and the export trade being brisk, the situation is unchanged. In trade circles there is very little doing, and unless business shows more animation in the near future, prices are likely to still further recede. The London market for the week was quiet with prices lower. Closing prices today follow: Lake, 12½c to 12¾c; electrolytic, 12½c to 12¾c; casting, 12¼c to 12½c. London's closings today follow: Spot, £56 12s 6d; futures, £56 15s. Exports for the month to date aggregate 4,943 tons.

Lead.—There is no change in the metal, which remains at 4.20c to 4.25c. St. Louis is firm at 4.02½c to 4.05c. London advanced to £11 15s.

Spelter.—Trade is quiet with spot firm at 4.85c to 4.95c. St. Louis is unchanged at 4.75c. London is weaker at £22.

Antimony.—Cookson's is 7.25c asked. Hallett's is 7.00c to 7.25c. Other brands are quoted at 6.00c to 6.25c.

Quicksilver.—We quote $42.50 per flask of 76½ pounds in lots of 100 flasks. London is £7 17s 6d.

Nickel.—Sales are made at 40c to 47c for large lots down to a ton, and at 50c to 60c for smaller quantities.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BLOCK, Aug. 9.

The metal markets are generally quiet. But there are practically no changes in prices. In spots there has been a slight shading of copper quotations but it is stated that it is not general. There is the summer dullness and consumers are not interested in future supplies. Lake copper is quoted at 13c for carloads and 13¼c for smaller lots; casting, 12⅝c for carloads and 13c for less than carload lots. Pig tin is firm at 28½c to 29c, according to quantity. Spelter, 5c to 5¼c in carload lots. Sheet zinc is without change at 6c for carload lots of 600-lb. casks, and 6.25c to 6.35c for less than carload lots. Pig lead is quoted at 4.10c for 50-ton lots, 4.15c for carload lots, and 4.25c for lesser quantities.

Old metals are also dull with prices unchanged as follows: Copper wire and heavy, 10¼c; copper bottoms, 9¼c; copper clips, 10c; red brass, 9¼c; red brass borings, 7¼c; yellow brass, heavy, 7c; yellow brass borings, 6c; light brass, 5c; tea lead, 3¼c; zinc, 3.40.

The Pittsburg Steel Co. Contract.

(Special Telegram.)

PITTSBURG, Aug. 10.—There was no meeting of the billet association in New York yesterday as reported. President Thompson, of the Republic Iron & Steel Co., was there, but no meeting was called or held. Whatever action is taken in this matter will be taken here later in the week. The Pittsburg Steel Co. contract last year was taken by the Carnegie Steel Co., but later was turned over to the Clairton Steel Co. when the latter threatened to withdraw from the association. The price was based on the selling price of Bessemer iron and ranged from $19 to $21 a ton, so the action of the Republic company is really not different from last year's. When the Clairton Steel Co. was absorbed the old contract was taken over by the steel corporation.

Lackawanna Steel Co. in the Structural Market.

(Special Telegram.)

PITTSBURG, Aug. 10.—The Lackawanna Steel Co. yesterday secured an order here for 3,000 tons of structural material for Chicago work. The Lackawanna company is not yet rolling shapes but expects to be soon. It is not yet a member of the beam association.

Independent Pipe Manufacturers.

(Special Telegram.)

PITTSBURG, Aug. 10.—A meeting of independent pipe manufacturers was held at the Hotel Lincoln yesterday. While prices and general market conditions were discussed, no action was taken.

The Bennington Typewriter Co., Dayton, O., has made an assignment, which is a step in the reorganization of the concern. The company came to Dayton from Kansas City last fall. Dissension among the stockholders has been one of the causes of the failure.

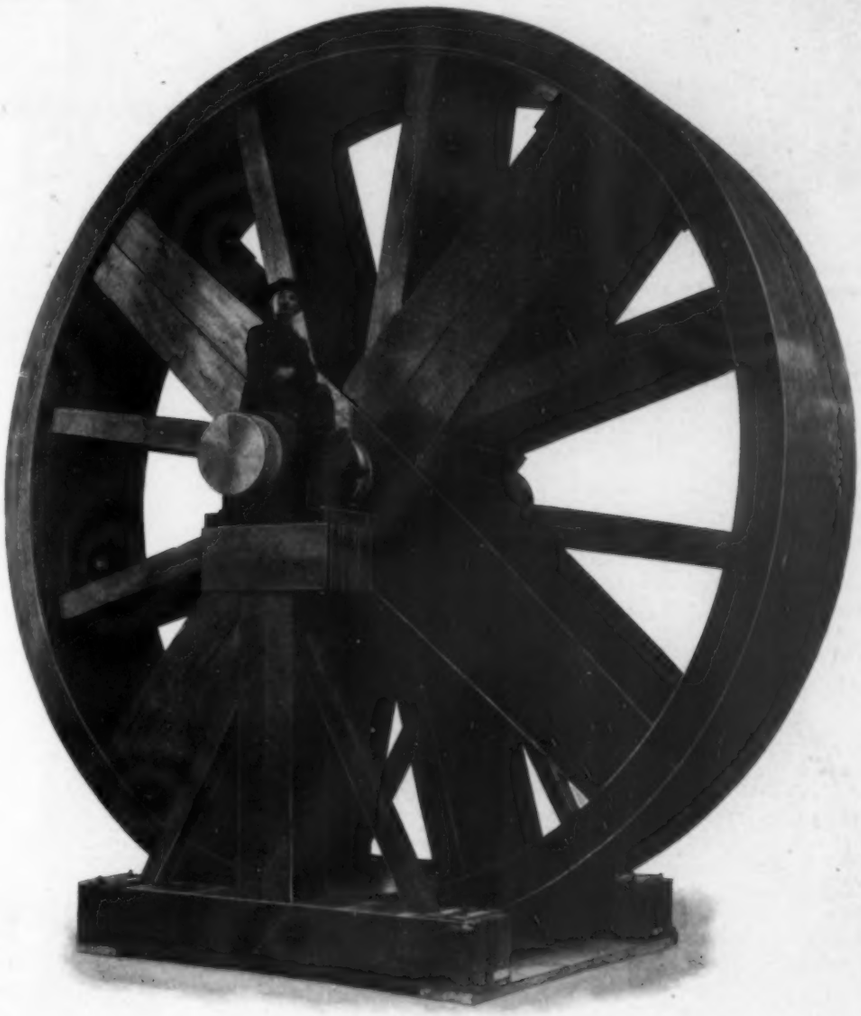
The court of Bucyrus, O., has confirmed the sale of the plant of the Flickinger Wheel Co., of Galion, O., to J. W. White, of Fort Wayne, Ind. It is expected that Mr. White will organize a new company.

The Taylor Corn Husker Co., Aurora, Ill., will build a new plant at Joliet, which will be much larger than the present one. The new buildings will include machine shop, foundry, power plant and wood working shop.

THE REEVES PULLEY CO.'S EXHIBIT AT ST. LOUIS.

Machinery Hall at the Universal Exposition is full of "big things," but towering above them all is the large pulley exhibited by the Reeves Pulley Co., of Columbus, Ind. This pulley is 20 feet in diameter and 52 inch face. It is mounted on a 12 inch shaft and is kept slowly revolving. The pulley is composed of over 11,000 separate and distinct pieces of oak timber which are nailed and glued together in such a manner as to throw the grain of the wood straight with the strain on the pulley and thus give it the greatest possible strength. Some 400 lb. of nails and 6,000 lb. of glue were used in the construction. This is without doubt the largest all-wood belt transmission pulley ever built, and is capable of transmitting 1,500 h. p. The proximity of man and pulley in the illustration shows the comparative sizes very clearly.

Another conspicuous feature of the exhibit is the No. 11 "Reeves" variable speed transmission. This is next to the largest size of transmission built by the Reeves Pulley Co. and was designed particularly for regulating the speed of a paper mill, but is admirably adapted for any service where variable speed and a large amount of power are required. It is capable of transmitting over 100 h. p.



A PULLEY EXHIBIT AT ST. LOUIS.

The exhibit also includes a large number of smaller transmissions, wood split pulleys, wood split pulley clutches, and iron-spider, wood-rim pulleys, the latter line having just been added by the Reeves Pulley Co.

July 30, 1904, was the twentieth anniversary of the shipment of the first carload of iron ore ever mined in Minnesota. On that date in 1884 a carload of iron ore was loaded at the old Breitung mine and shipped to Two Harbors. The occasion was marked by a general celebration at Tower, in which Duluthans and others took part. The most prominent figure in the event was Charlemagne Tower, now ambassador to Berlin from the United States. His father sent him in 1883 to take charge of the construction of the Duluth & Iron Range railroad and the opening of the mines. The son promised that the first carload of ore should be shipped to Two Harbors by the first day of August, 1884, and he made good his promise.

Rail Making at the Soo.

Vice President Drummond, of the Lake Superior Corporation, in asking the Temiskaming railway, which is owned by the Ontario Government, to give the Algoma Steel Co. a contract for 10,000 tons of rails, made the following statement:

"With my practical knowledge of the steel industry I can assure you that the rails which the Soo plant will turn out will be of the best quality. The management has now given up the idea of using Canadian ore exclusively in the manufacture of rails, at least for the present, or until sufficient quantities of high grade Bessemer ore have been discovered in Canada within reasonably cheap access of the Soo. The company has, however, secured rights to a large quantity of excellent ore in the iron ranges of Minnesota and this will be utilized in the production at the Soo. A certain percentage of Helen mine ore may also be used. Preparations are now being made for the active operation of the famous Michipicoten mine, and while only small quantities of the ore can be used by the Soo plant, there is a ready market in the United States for all that can be mined."

The net earnings of the Sloss-Sheffield Steel & Iron Co. for July, 1904, after paying interest and taxes, were $79,581.

MESTA BLOWING ENGINES.

About five years ago, the Mesta Machine Co. built a large plant, consisting of a foundry, machine shop, etc., at West Homestead, Pa., adjoining the large works of the Carnegie Steel Co. The buildings are constructed of fireproof material. The machine shop is 85 feet in width and 820 feet in length and the foundry is 125 feet in width and 820 in length. The plant is equipped with the most modern electric traveling cranes, machine tools, etc., and was designed especially for the building of heavy duty engines and rolling mill machinery. The designing and building of blast furnace engines was given special attention. After a study of

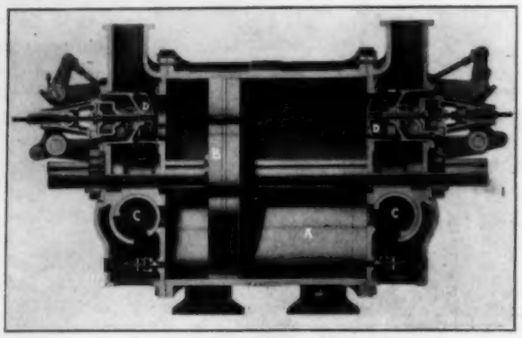


FIG. 1.—SECTIONAL VIEW OF MESTA MACHINE CO.'S 84 X 66-INCH AIR CYLINDER FOR HORIZONTAL BLOWING ENGINE.

the requirements of blast furnaces in the different localities in the United States, the Mesta Machine Co. decided on four different designs or types to meet different conditions: Horizontal cross compound blowing engine, vertical disconnected blowing engine, vertical cross compound blowing engine, long crosshead blowing engine with high pressure steam cylinder and the long crosshead blowing engine with low pressure steam cylinder. These engines were designed after a careful study of the types of blowing engines that have been employed, and the object in view was to overcome the defects that had developed in the engines then in use, and to design engines that would give the greatest economy and

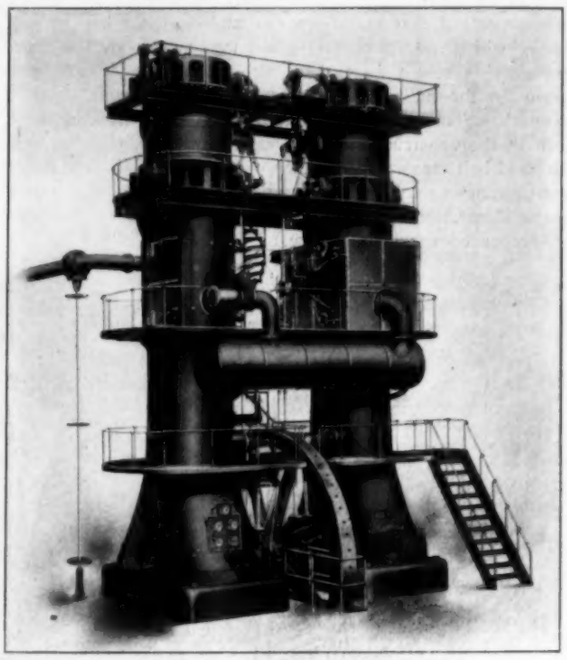


FIG. 3.—VERTICAL CROSS COMPOUND BLOWING ENGINE BUILT FOR THE CARNEGIE STEEL CO.

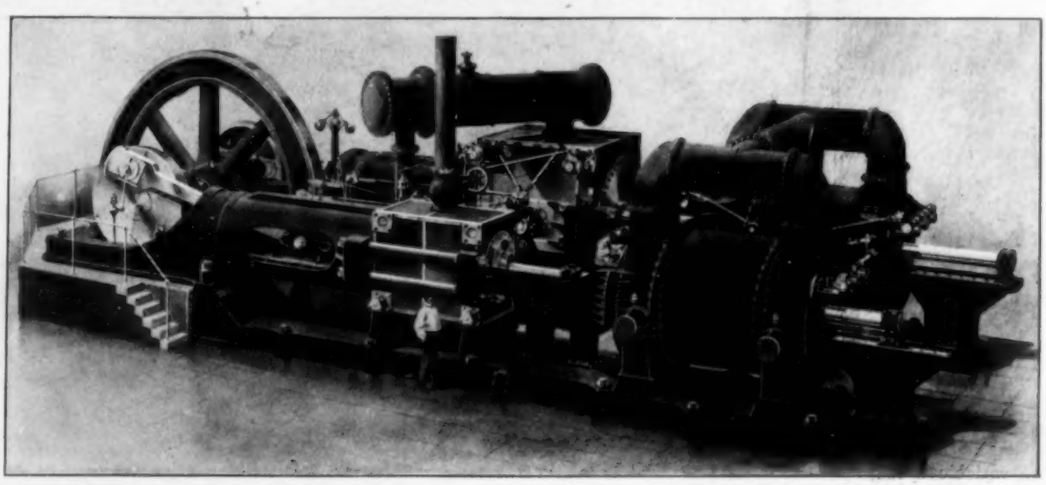


FIG. 2.—HORIZONTAL CROSS COMPOUND ENGINE FOR THE ILLINOIS STEEL CO.

durability. The Mesta Machine Co. has built about fifty engines of the four different types mentioned.

One of the most difficult problems in the designing and building of blowing engines is the air valve. Fig. 1 shows a section of the Mesta Machine Co.'s 84 x 66-in. air cylinder and valves. It is claimed that a cylinder equipped with these valves has a minimum of clearance. The inlet valves C are of the rolling type, which only move when free of pressure and with the least possible clearance and can be operated successfully at any speed up to 80 revolutions per minute. These valves are operated by a wrist plate driven by an eccentric on the engine shaft. The outlet valves D are positively closed and automatically opened. The valve is of forged steel and as light as possible, but of sufficient strength to stand the pressure with safety. This pan-shaped valve differs from similar valves of this type, inasmuch as it has a stem extending to the outer part of the cylinder, while other valves of this type have no stem and are closed by compressing the air in the cylinder in which they float or move. In valves of this type the operator has no control over the valves in case they get to hammering on the seats, which would soon cut the valves and seats where they touch. The valve D shown in the illustration has a stem extending to the outer part of the cylinder and has metallic packing where it passes through the outer shell of the cylinder. There is a dash pot outside of this packing and the piston is attached to the valve stem. This dash pot cushions the valve in opening as well as in closing and the action of the valves can be regulated while the engine is in operation by opening or closing the air vents at either end of the dash pot. In addition to this mechanism there is a moving block supported by guides through which this valve stem passes and which is operated from the same wrist plate which drives the inlet valves. By this means the valve is positively closed and automatically opened, as after the valve is closed the block moves back to let the valve open freely. The Mesta Machine Co. has about 192 of these valves

in operation at the present time. Patents have been applied for. Another type of outlet valve is built by this company which is automatically opened and automatically closed. A piston inlet valve is also built, but the rolling valve is preferable on account of less clearance and repairs.

The first type of engine designed and built by the Mesta Machine Co. was a horizontal cross compound blowing engine, Fig. 2. This has steam cylinders 44 and 84-inch in diameter and 66-inch stroke and air cylinders 84-inch in diameter and 66-inch stroke. Where sufficient floor space can be obtainable and where large units are required this engine is best adapted for blast furnace and Bessemer work. The engine has been so designed that all its parts are readily accessible. The large bearing on the foundation imparts great rigidity. The main frame or pillow block is massive and rigidly bolted to the foundation. The base plate forms a support for all the parts of the engine and assures perfect and permanent alignment. The pistons are made of cast steel and the piston rods are of the highest grade of forged steel and sufficient in size to carry the pistons entirely free of the cylinders. Only the cast iron packing ring comes in contact with the walls of the cylinders. The method of supporting the piston rods is well shown in the illustration. The company has built five pairs of these engines for the Illinois Steel Co., for furnishing blast for two 600-ton furnaces at the South Chicago works. These engines have now been in successful operation about four years and it is stated that they show high economy. The Mesta Machine Co. has also built a pair of these engines for the Joilet works of the Illinois Steel Co., and has recently furnished three pairs of the same type for the LaBelle Iron Works of Steubenville, O.

Where vertical engines are preferred and high speed is required, the vertical disconnected blowing engine is well adapted. One of these engines has on the high pressure side a 44-inch steam cylinder and 84-inch air cylinder by 60-inch stroke, and the low pressure side has an 84-inch steam cylinder, an 84-inch air cylinder by 60-inch stroke. The engines can be run as cross compound or they can be run as separate engines by providing a reducing steam valve for the low pressure engine. This type of engine has a number of advantages. One is the ready access to all the cylinders and other parts, especially for medium sized furnaces where units of single cylinders are desirable. The construction of the engine is suitable for operation at a very high speed.

The Mesta Machine Co. built three of these engines—two high pressure and one low pressure—for the Cleveland Furnace Co., of Cleveland, which have now been in operation for over a year. D. T. Croxton, general manager of the Cleveland Furnace Co., makes the following statement: "We have had them running up to as high as 80 r. p. m. and in one instance the have blown against 40 lbs. air pressure without any apparent difficulty. During the general operation we operate the two high pressure engines compounding into one low pressure all running at the same speed, anywhere from 30 to 50 revolutions per minute, depending upon how much we want at the furnace. The plant connected up in the way we have it, is capable of any kind of a quick change within a few minutes, in case we want to shut one of the engines down. In other words if we should have a maximum of 120 revolutions on the furnace, which would give us about 45,000 cubic feet of air, which is all we care to blow at any time, we can produce it by running the three engines at 40 revolutions or we can produce it by running the two engines at 60 revolutions, thereby being able to take off an engine

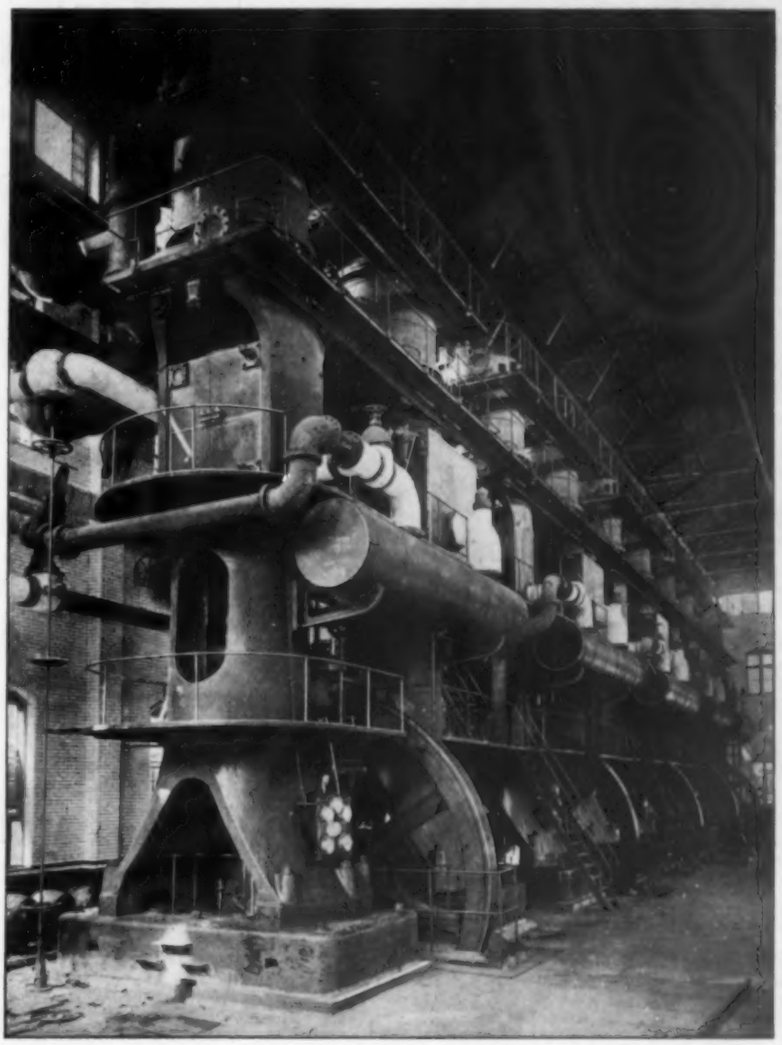


FIG. 4.—FIVE PAIRS OF VERTICAL BLOWING ENGINES AT THE DONORA WORKS OF THE CARNEGIE STEEL CO.

without reducing the operation of the furnace. The valves operate with little or no trouble. This engine regulates to the fraction of one percent which we consider very accurate work. They have a very exceptional advantage in that we can get into any of the cylinders by merely lifting the one head which is, from an operators standpoint, a splendid arrangement, as it enables one to keep them in excellent order with very little expense."

The vertical cross compound blowing engine shown in Fig. 3, has steam cylinders 44-inch and 84-inch in diameter by 60-inch stroke and air cylinders 84-inch in diameter by 60-inch stroke. The height of the engine from the floor line to the top of the air cylinder is 46 feet and the weight of the engine is about 950,000 pounds. This type is suitable where large units are required and the floor space is limited. While it has a disadvantage over the horizontal engine on account of its parts not being so readily accessible, it has an advantage on account of the large cylinders being vertical instead of horizontal which avoids uneven wear, without the necessity of carrying the pistons on the rods in order to prevent the pistons from wearing the bottom of the cylinders. The Mesta Machine Co. recently built five pairs of these engines for the blast furnace plant of the Donora Works of the Carnegie Steel Co. The interior of this plant is shown in Fig. 4. It is a noteworthy blast furnace power plant, the building being a fireproof structure and the interior lined with white tile. This plant furnishes blast to two 600-ton furnaces recently built by the Carnegie Steel Co.

The high and low pressure long crosshead type of blowing engines, Fig. 5, is one of the oldest types of blowing engines. The high pressure engine has a 44-inch steam cylinder and 84-inch air cylinder by 60-inch stroke and the low pressure engine has an 84-inch steam cylinder and 84-inch air cylinder by 60-inch stroke. It is adapted to medium sized furnaces of the kind so extensively used in the South. While the type is old, the design is new, i. e., it is equipped with the same design of air valves and as well and heavily proportioned throughout as its other types of blowing engines. The crosshead of this engine has probably given more trouble than any other part of it. For this reason the Mesta Machine Co. has given special attention to this part of the engine. It is made of a very deep I-beam section and of the best thoroughly annealed cast steel. Instead of connecting the rods directly into the crosshead they are connected to a steel sleeve which passes through the crosshead with some clearance and is attached to the crosshead by means of a large steel pin. This arrangement allows the two connecting rods to get somewhat of an unequal length without straining the crosshead or bending the piston rods. The engine is also provided with steel stairways and cast iron platforms making all parts accessible. The Mesta Machine Co. has recently completed an order for 18 of these engines for the Tennessee Coal, Iron & Railroad Co., which is probably the largest order for blowing engines ever placed. Twelve of these engines are to replace the old engines at the blast furnace plant at Ensley and the other six are to furnish blast for two new blast furnaces. The company has also recently furnished two of these engines to the Woodward Iron Co., of Woodward, Ala.

The Mesta Machine Co. has just purchased the property of the American Bridge Co., adjoining the works, consisting of about ten acres, on which it is constructing additions to the present plant. When these additions are entirely completed the present capacity will be more than doubled and blowing engines will be, it is expected, one of the principal products.

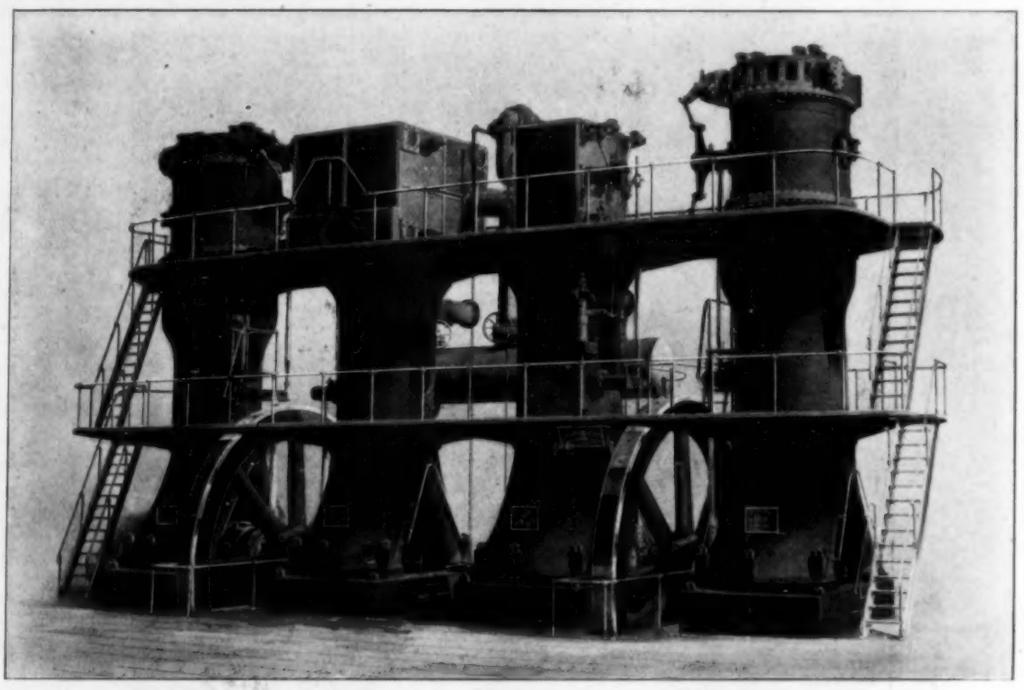


FIG. 5.—VERTICAL COMPOUND, DISCONNECTED TYPE, BLOWING ENGINES AT PLANT OF CLEVELAND FURNACE CO.

In the bankruptcy case of the New York Car Wheel Works, Buffalo, the court decided last week in favor of P. H. Griffin, the former president of the bankrupt concern, in the suit brought by the trustee. The latter sought to have President Griffin turn over to the creditors $10,000, the proceeds of the sale of certain bonds of the Peckham Mfg. Co., of New York, and $585.63 obtained on a check from the Midvale Steel Co., of Philadelphia, to the bankrupt company and which the referee in bankruptcy had ordered should be paid to the trustee for the creditors. The court sustained Mr. Griffin in his contention that he was an "adverse claimant" to the funds, denying the jurisdiction of the referee in bankruptcy. It is probable that the trustee will appeal. This is a test case in a total indebtedness of about $600,000, which the trustee claims Mr. Griffin owes the car wheel works.

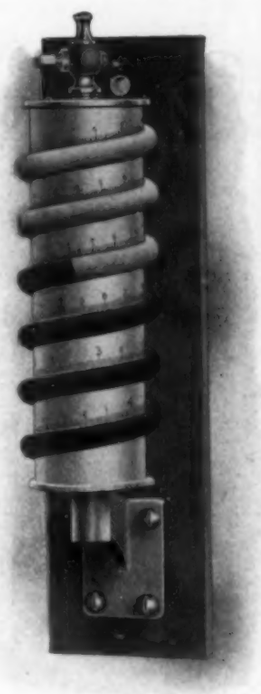
F. R. Phillips & Sons Co., of Philadelphia, announces that owing to the death of F. R. Phillips, of London, W. Vernon Phillips has gone over to assume charge of that branch of the business, while F. Rees Phillips, formerly at the Pittsburg branch, will take charge of the Philadelphia office. As the remaining partners they will continue the business in the same manner as heretofore without change and under the same name. In the near future John J. H. Phillips, now at the London office, will be admitted as a member of the firm.

THE SARGENT DRAFT GAUGE.

The importance of being able to tell the chimney draft at a glance is fully recognized by the operating engineer. The necessity of knowing the pressures maintained where quantities of air are moved is becoming more apparent to ventilating engineers. In testing gas engines for their thermal efficiency, the pressure of gas as well as the barometer readings must be accurately recorded if correct results are desired.

For such purposes, an ordinary U-shaped glass tube has been used and the difference of the level of the liquid in the two legs taken as the pressure. Aside from the fact that you can seldom read closer than ¼ of an inch on account of the menisci varying with the direction of movement of the liquid, and that you must take two readings and add or subtract to get the correct result, and that the tube is fragile and often gets broken, the device gives good results.

In order to read closer than ¼ of an inch, a glass tube has been used in an inclined position giving 10 inches travel for 1 inch rise. This renders the readings finer but limits the range for practical purposes, as a tube showing a difference of pressure up to 6 inches rise would be 5 feet long. The necessity of accurate determinations and the desirability of a strong, portable, direct-reading, and unbreakable draft



A NOVEL DRAFT GAUGE.

gauge or manometer which can be mounted on a gauge board and which can be read to one hundredth of an inch and of a capacity of 6 inches pressure or vacuum, led to the invention of the instrument here illustrated.

It consists of a nickel-plated brass cylinder, closed at both ends, and encircled with a spiral groove in which is wound a transparent and flexible celluloid tube. The bottom end of the tube is cemented in and communicates with the interior of the brass chamber. An extension of its lower head passes through the bracket which supports the gauge yet allows it to be revolved at will around its vertical axis. The whole device is mounted on a handsome board and can be attached to a gauge board if desired.

A small hose cock to which a rubber tube can be attached, admits pressure through the top head of cylinder. Distilled water, usually colored, is put in the cylinder through this cock until the zero mark is reached on the scale.

Pressure will cause the level of the liquid to ascend in the tube, and for every inch of vertical rise it will travel around the cylinder, a distance of about 9 inches, which is divided into 100 equal parts. The angle of the tube is such that the plane of the miniscus is radial, making close reading possible. The cylinder can be rotated so that the level of the liquid may be read off on the front side of the instrument. Rarefaction causes the liquid to descend, and by adjusting the cock, any degree of steadiness of the level in the tube may be obtained. The upper end of the tube is closed with a screwed brass plug and the inlet cock is shut when the gauge is carried about, maintaining the liquid in place without danger of spilling.

As the tube is tough and elastic, it is not liable to be broken. The whole device is 3 inches in diameter by about 12 inches long and weighs about 3 pounds. The instrument was invented by C. E. Sargent, of Chicago, and is sold by Schaeffer & Budenberg, of New York and Chicago.

Continuous Open-Hearth Process.

In a recent number of *Stahl und Eisen*, Dr. Surzycki describes an open-hearth furnace that has been working satisfactorily since September, 1902, at the works of B. Hantke, at Czenstocha. In this furnace, which is of 30-ton capacity, two tap-holes situated one over the other, but not in line, lead into a double spout by which the whole or any part of the contents of the furnace are easily tapped at any time. The furnace is charged with cold scrap to which, when melted, molten pig iron from a blast furnace or a mixer is poured in. When the bath is quiet, iron ore and mill-scale are added, and a further amount of pig iron. The charging lasts until the furnace is quite filled. The charge is de-phosphorized by adding lime, and when de-carbonization has gone far enough the furnace is tapped. The de-oxidation of the steel is carried out by adding wood carbon and ferro-manganese in a ladle during the tapping of the charge. After tapping, the upper tap-hole of the furnace is closed and the furnace repaired. A calculated amount of ore and roll scale and a proportionate amount of pig iron is then run in. The practice is carried out uninterruptedly for one to two weeks. If, from any cause, the remainder of the furnace contents must be cast, it is easily done by opening the lower tap-hole. The method, while based on the Talbot process, has the advantage that it may be worked in an ordinary fixed furnace, if not too small. —[Journal of Franklin Institute.

A Feed Water Heater on a Gas Engine Exhaust.

About 40 percent of all the heat of the gas that goes into a gas engine is lost in the sensible heat of the exhaust gases. If any use can be found for hot water around the plant, this heat can be recovered to a very large extent. The cooling water passes around the cylinders in the water jacket, and then generally goes to waste. At a gas engine plant at Madison, Wis., this water is led through a feedwater heater after it leaves the jackets, and there takes up additional heat from the exhaust gases that pass on the inside of brass tubes, while the jacket water passes on the outside. By this scheme, the feedwater, which enters the jackets at 40 Fahr., and leaves them at 100 degrees Fahr., enters the feedwater heater at 100 degrees Fahr. and leaves it at 210 Fahr. The pump that supplies the cooling water to the engine jackets forces this water on through the feedwater heater over to the boilers at the gas works, where it reduces the steam fuel expense 12 percent.—[F. W. Richards, in Wrinkles.

Chas. M. Schwab returned Aug. 5 from a short trip to Europe. "I went over for a rest and also to study the method of manufacturing armor plate," he said. "I have been very much interested in what I have seen there. I went to the Krupp works and looked into the manufacture of armor, but let me say that I saw nothing either as to method or price which will cause a change in the manufacture of armor over here." He confirmed what he already believed to be a fact that the United States steel masters and their mills can make steel cheaper than any other country on earth, and of better grade according to requirement.

The directors of the United States Cast Iron Pipe & Foundry Co. have increased the preferred dividend rate ¼ of 1 percent for the last quarter. The declaration was 1¼ percent, compared with 1 percent paid in the previous quarter.

Blast Furnace and By-Product Coke Plant of the Zenith Furnace Co.

It has always been the dream of enthusiasts at the head of Lake Superior that some time the iron trade should have a place there. From time to time various schemes have been undertaken, occasionally indeed by land boomers whose interest in iron manufacture was subservient to that of selling lots, but they have invariably failed when put to the actual test of every-day, year-after-year conditions. A recital of the various plants that have been projected at the head of Lake Superior, and in some cases completed and operated, would be a tedious catalogue, a schedule, too, of weakness and in some cases of failure.

But it is easy to look back and see why these plans were ineffectual, and why every plant projected for Duluth or Superior met with ill luck. In the first place earlier efforts—there was a charcoal blast furnace at Duluth as far back as 1871, when there was no ore nearer than Marquette—did not give sufficient weight to the question of markets. There was not then, and there has not been until quite recently, any important market for iron and steel in the Northwest. Of course, ore could not be brought to a 30-ton furnace from the Marquette range and limestone from Lake Erie and give a product that could be shipped east in competition. Fuel was always a serious consideration and the shipment of coke all rail from Connellsville made a cost that more than one operator found by experiment was prohibitive of profit. Coke could not take advantage of the low lake freight that has always been made on coal. Once at least suspension came from the bankruptcy of the concern buying pig iron made there. Other attempts showed lack of sufficient capital or a want of the necessary initiative.

It has been evident enough on paper that, with a market reasonably near, it is cheaper to bring the fuel to the ore than the ore to the fuel. It takes more ore than fuel to make a ton of iron and the rate of freight westbound on coal is about 40 percent of that eastbound on ore, and so continues, year after year. That it will be stable at about this proportion is unquestionable, so long as the great bulk of the freight moved is eastbound. On the other hand is the matter of labor. It has always been contended that it cost more in the Northwest than elsewhere. And by the wages per hour so it does. But the Zenith Furnace Co. had an opportunity to test this question during recent construction. In concrete work, similar to what Mr. Andrews, in charge of coke oven building, had erected at Hamilton, O., he found labor costs at Duluth the past winter the less—this, though at Duluth, the wages were $2 per day and at Hamilton they had been $1.60. Any question of relative wages and work resolves itself into one of food and shelter, and it is also the fact that the better the laborer is cared for and the better food he eats, the more work he will do. This is no mere local proposition; it is general and of world-wide application and it is of importance in this connection.

It remained for A. B. Wolvin, of Duluth, to associate with himself a group of capitalists who were willing to put in adequate money to make pig iron on a scale sufficiently large to avoid the difficulties of fuel, finances and, ultimately, of a market also. For it is no secret that the present owners of the Zenith Furnace Co. are prepared to continue development to any reasonable extent that may promise dividends.

The Zenith Furnace Co. was organized about a year ago and bought the blast furnace at Duluth that had been built by John Birkinbine fourteen years before. Though reasonably modern when erected it had been remodeled and enlarged more than once, but the new owner immediately proceeded to plan another reconstruction and enlargement, which has now been sufficiently completed to permit the operation of the plant. About $1,000,000 has been spent by the company since it bought the furnace, and most of this money has gone into the fuel side. The result is that it has now a furnace plant that can make coke Bessemer and malleable iron at as low a price as any possible competitor, and that can put its products into markets further away than could have been reached by any of the previous operators in this district.

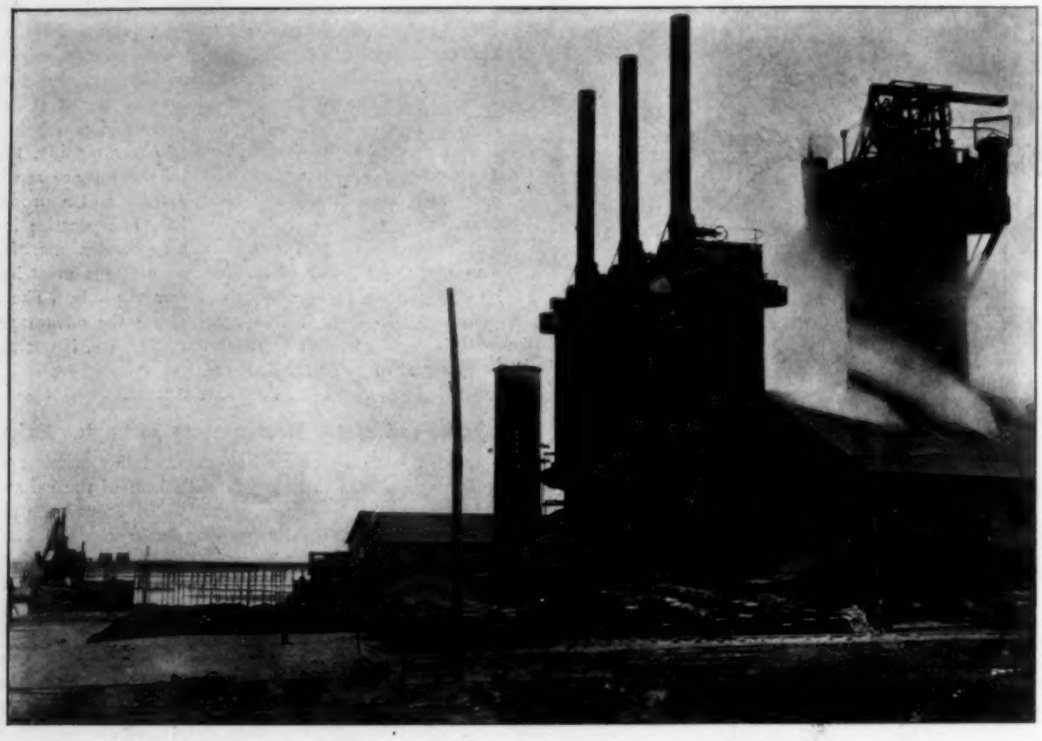


FIG. I.—VIEW OF BLAST FURNACE AND STOVES.

The initial proposition in the minds of the men back of this enterprise was that coke must be made at the furnace, in order to take advantage of the low rate of freight on coal, save their coke from injury in transit and utilize the by-products. A population of more than 100,000 stood ready to take a part of these latter, and avenues in which the rest might be worked off were sure to be open as soon as the public should receive a little needed education. Contracts were made with the owners of the Otto Hoffman coke patents for the installation of a battery of 50 ovens, with capacity for about 350 tons every 24 hours, and this plant is now completed and in operation. As soon as the ovens are working smoothly to capacity the 250-ton furnace will be blown in on

malleable, later turning to Bessemer iron. Contracts for the sale of this product have been closed that insure the operation of the plant for a long time, and it is entirely probable that in due course the company will consume its own pig in the manufacture of minor steel products suitable for the Northwestern market.

The plant is well situated in the harbor of Duluth, with a frontage of 6,800 feet on deep water, to which 1,200 feet can be added by dredging another slip, and reached by any ships that sail the lakes. Since the completion of these docks such vessels as those of the Provident, Pittsburg and Peavey fleets have been frequent arrivals. Work on the coal docks and ovens was begun last fall and was carried on continuously all winter. On a foundation of solid sand filled crib work there is a coal dock covering 300 by 1,200 feet. This has a storage capacity for about 250,000 tons of coal and limestone. Along its entire inner face is a series of pockets, surmounted by a belt line cable railway, for loading coal out for the general market. The company is now shipping about 40 cars a day for the railroad trade. This dock, with its superstructure and pockets, required more than 4,000,000 feet of timber, all of which was Oregon fir. The face of the dock is fitted with three sets of Mead hoists for unloading vessels. This is an automatic system of the latest type in which no shovelers are necessary in the hold of the ship, and scarcely any men above. An engineer, a tripman and one or two others are able to handle each hoist. Connected with the system is a belt cable railway covering the entire periphery of the dock at an elevation of 40 feet. A traveling truss steel bridge, 300 feet long, at the same elevation, also covers the entire dock. Cars on this cableway are arranged to trip and unload automatically anywhere desired, and at any point where the bridge may be halted switches connect it with the cable tracks. On this bridge is the coal pick-up, a bucket for moving coal where desired.

On the inner face of the dock and beneath the cableway is a Williams crusher, for reducing to proper size for the ovens all coal destined for coking. From this crusher a link belt bucket conveyor rises to the top of a 1,200-ton bunker above the end of the coking battery and to a height of 80 feet. Coal to be coked passes the crusher, is broken to the size of a grain of corn and is raised and dropped into the large bunker. From this it is fed through doors in the bottom, into an automatic scale larry of size sufficient to contain an oven charge of 8 tons. This larry feeds into the ovens through six discharge pipes and distributes the coal fairly evenly the length of the oven. Contrary to general practice and an improvement thereon, this larry traverses the top of the battery, not on the brickwork, but suspended from an overhead bridge, a steel truss 200 feet long extending the full length of battery and bunker. In this way all strain of the heavy larry trundling back and forth over the battery is avoided, and the life of the brickwork is doubtless considerably prolonged.

The retorts, each 17 inches in width, 33 feet in length across the battery, and with a height of 7 feet available for filling with coal, will carry a charge of 8 tons each. There are 50 of them. The probable duration of fire is 24 hours, giving a daily charge of about 400 tons of coal and a daily output of 350 tons of coke. These retorts, with combustion chambers surrounding them, their regenerative chambers, their gas and liquid mains, etc., require a concrete and masonry structure about 36 feet by 200 and 40 feet high. Above it is the bridge for the charging larry and at one end the large bunker for receiving crushed coal for charging. As the process is the United Otto, installed by the American Coke & Gas Construction Co., and is the latest plant to be erected, it is decidedly up to date, and is claimed by the American company to be the best installation it has ever made. Minor changes from previous practice have been adopted throughout the plant, but the well-known principles of the Otto process are used.

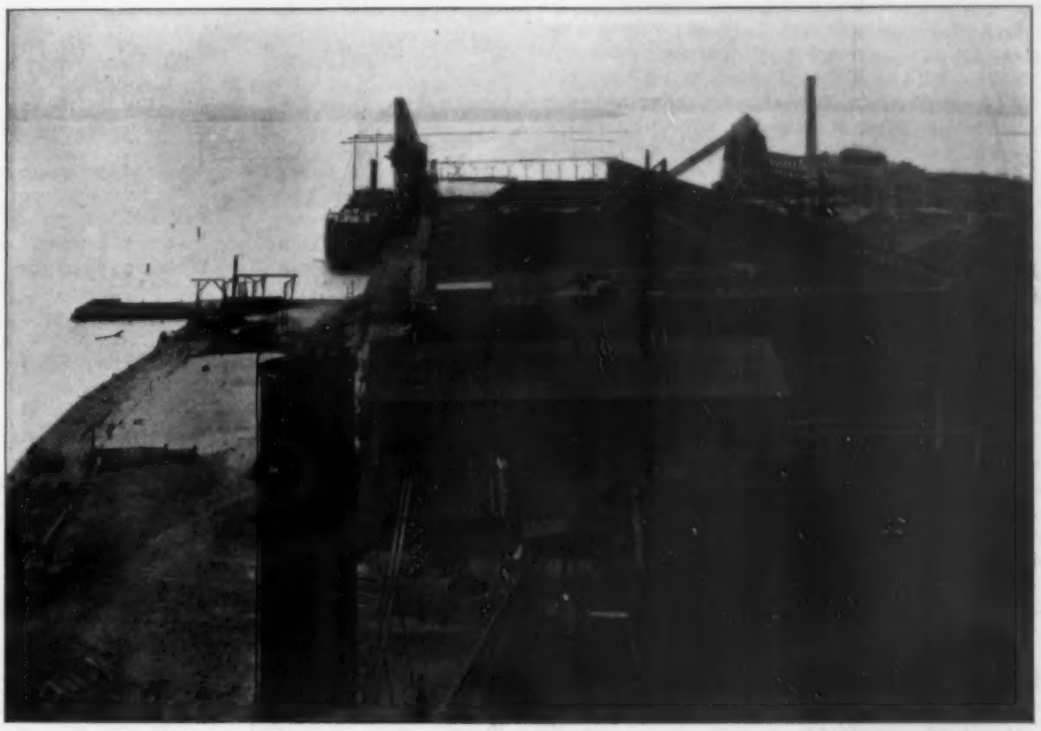


FIG. 2.—VIEW OF FURNACE SKIP HOIST, STOCK HOUSE, DOCKS, COAL STORAGE YARD AND BINS, AND COKE AND BY-PRODUCT PLANT.

By-products pass out of the ovens and into a gas house where the separation from tar and ammonia is carried on. By the use of a new screen system in the coolers gas is freed from tar before it reaches the usual tar extractors and a decided saving results. Tar and ammonia liquor pass off and are marketed elsewhere, while the rich gas is sold to the cities of Duluth and Superior for domestic purposes. A contract was made with the light and water department of Duluth and the private company that furnishes Superior to supply their mains at a slight concession from their retail prices. In Duluth these prices vary from 75 to 90 cents per thousand feet, while at Superior they are higher. Daily consumption during summer months in Duluth, when demand is at its minimum, is about 225,000 feet per day; in Superior about half as much. The company is running just now on a basis of about 10,000,000 feet per month. In order to increase the use of by-product gas for heating purposes the Zenith company has arranged to heat buildings of all classes during a portion of the year, and will install removable burners for the purpose in steam and hot water plants. The company does not

favor the heating of buildings during the extremity of winter, on account of the large consumption and consequent heavy cost to the consumer, but except for about 90 days expects to compete with coal. By-product gas has already been turned on the Duluth mains and will be in use at Superior as soon as the subaqueous main across the harbor is in readiness.

For the present, tar and ammonia will be shipped and sold elsewhere. But the Duluth Tar Co. has been organized and will erect a large plant for the manufacture of tar felt and building paper. Among the stockholders of this company are important local wholesale dealers and the Barrett Mfg. Co., the largest and most successful maker of tar paper in the country. It may not be generally known that the Northwest is the great consumer of this class of material, and that more than 20 percent of the entire product of American mills has for several years been distributed through Duluth.

The furnace plant consists of a stack 76 feet high and 16.6 feet bosh, with a daily capacity for about 250 tons. There are three vertical blowing engines, two Tod engines and a new one of the American Shipbuilding Co. type. Three large stoves that were put in originally are still in excellent condition, but another will probably be added later. The top of the furnace has been rebuilt and is now entirely modern. As soon as the work can be undertaken methods of loading the charging skips will be overhauled and automatic devices of modern type installed in the stockhouse. A cableway will operate between the ovens and stockhouse to bring fuel automatically, while the loading of ore will be without hand labor. In other words, whatever about the plant is not strictly up to date will be made so as fast as the engineers can undertake the task.

Everything about this works is well built, and all the new work put in during the past year is constructed to stay. On the coal dock, for instance, all structures and bridges are built for a wind pressure of 70 miles an hour, with the customary factor of safety. There was never a wind recorded at the head of the lakes in excess of 64 miles, and that was simply a peak of two minutes' duration. In the gas plant every machine is in duplicate, three in place for the work of each pair, and this system has been carried throughout.

Interests connected with the furnace company are associated with the Provident, Peavey and Great Lakes and St. Lawrence steamship companies. Independent connections all the way through are unusually complete and valuable. The pig iron selling end is represented by the firm of Pickands, Brown & Co., who are large stockholders. Other jobbing interests connected with the concern include members of the wholesale house of Marshall-Wells Hardware Co., of Duluth, one of the three or four chief companies in its line in the United States. C. W. Andrews, formerly president of the Hamilton Otto Coke Co., is manager of the coal, coke and gas department, and Geo. W. Foote, recently with the Illinois Steel Co., is superintendent of the blast furnace division. Aside from the men mentioned above, a number of Duluth, Chicago and Cleveland capitalists are associated in the company, whose capital stock is $1,000,000.

Heroism in a Rod Mill.

The *Monthly Bulletin*, devoted to casualty insurance, notes two recent instances of heroic action, which may properly receive the notice of custodians of Mr. Carnegie's hero fund:

"The first case occurred in a rolling mill. Rods about one and one-half inches in diameter, and thirty or more feet long, were being manufactured. Several of these rods were put through the rolls at the same time, the head of each rod being entered about five feet behind that next to it, so that each rod could be seized by the tongs and entered into another set of rolls that would still further reduce the size. It happened that in some way the operator missed the first rod. As it was quite hot and soft, it bent downward until it touched the floor, and then began to twist and turn in any direction where it met resistance. One of the bends caught the operator and encircled him before he could turn off the power. The other rods continued to come out on the floor and to bend and twist in the same manner, until the whole place was filled with writhing and twisting red-hot rods. Notwithstanding this, a fellow workman attempted, at the risk of his life, to cross the floor in order to shut off the power. He was caught by one of the rolls and fatally burned.

"The other incident is that of a workman who seized an open can of benzine in a burning building, and carried it through the building to a place out of the range of the fire. In doing so he had to traverse a wooden shop that was on fire. His object was to avert the danger of an explosion. He succeeded in his purpose."

Longitudinal Steel Rail Support.

Chas. H. McDermott, of Eveleth, Minn., has patented a substitute for the ordinary wooden cross tie for railroad tracks. It consists principally of a continuous steel support for the rail, the cross section being T-shaped, with the cross line of the T considerably greater than the vertical line. These longitudinally extending plates underneath the rail are pressed by pins or teeth arranged in rows extending longitudinally of the plates near their edges. These teeth extend into the ground for some distance and serve to keep the track supporting plates in position. The rails are secured to the supporting plates by means of rail-holding plates bolted at intervals and overlapping the base of the rails at their inner edge. Tie bars extending transverse of the track, and in that respect resembling the present wooden tie, hold the opposite sleeper plates together and prevent any spreading of the rails. The sleepers are provided on their under side with longitudinal plates, operating to strengthen the sleepers and prevent its lateral movement when resting on the ground.

The exhibitors in Machinery Hall and the Steam and Fuel building, at the St. Louis Exposition, have organized the Machinery Club to promote the social and business interests of the exhibitors. Fifty members have been enrolled. After the adoption of the constitution the following officers were elected: President, J. S. Holmes, of Buffalo; first vice president, Colonel F. F. Coleman; second vice president, F. A. Gale; third vice president, Captain W. H. Greenland; secretary, H. D. Aller; treasurer, Leon Piaud. Other members of the executive committee are: F. N. Bausch, Caspar M. Brown, John Cabot Jr., W. H. Arison, Fr. Froelich, A. W. Hall, J. W. Gardner, Graham Smith, G. A. Walker and F. C. Woodrough. The membership of the club will approximate 200, and quarters will be equipped in Machinery Hall. Arrangements will be made for the proper reception and entertainment of distinguished visitors.

A director of the Warwick Iron & Steel Co. is quoted as saying: "The relining of our No. 2 furnace, the new large one, will be put in position to resume when trade conditions again become such as to make it profitable to operate. Both furnaces were in operation up until two months ago, but of course results of the company's business for the first half of the year were not as good as for the corresponding period of 1903, when a fair profit was made. The relining should be completed by October. Its cost is provided for by a special reserve fund set aside for the purpose."

July broke all previous records for freight traffic through the canals at the Soo. During last month 5,609,079 tons of freight were recorded, an increase over August of last year—which held all previous records—of 205,271 net tons, the record for August, 1903, being 5,403,808 tons. Of this vast volume of freight 4,817,203 tons passed through the American canal and 719,876 tons through the Canadian. The eastbound record was 4,086,822 and the westbound record 1,522,257 tons. The movement of iron ore was heavy, 3,587,685 tons being taken down from the head of the lakes.

A decree has been filed in the United States court at Wilmington, Del., dismissing the bill of complaint in the suit of Percy H. Brindage, of New York, against the Lobdell Car Wheel Co., of Wilmington. Brindage set forth that he organized the National Car Wheel Co., a consolidation of car wheel manufacturers, and that the Lobdell Car Wheel Co. agreed to dispose of its plant and business for $1,500,000, but failed to do so. The Lobdell company will continue as an independent concern.

PERSONAL.

Benedict Crowell, of Crowell & Peck, Cleveland, who is examining mining properties in Alaska, reports that mining operations are quite active in that section, and a number of new properties are being rapidly put in shape for producing ore.

W. H. Whiteside, general manager of sales of the Allis-Chalmers Co., has been appointed general manager of sales of the Bullock Electric Mfg. Co., so that he will have entire charge of the sales departments of both organizations.

L. N. Harris, for the past two years superintendent of the United States Cast Iron Pipe & Foundry Co.'s plant at Bessemer, Ala., has resigned and W. R. Nicholls, for a long time master mechanic, has been appointed to the vacancy. Mr. Harris will remove to Birmingham, where he will go into business.

Charles Colcock Jones, lately mining and examining engineer of the Mountain Copper Co., Ltd., of Shasta county, Cal., has opened an office for consulting work in mining and metallurgical engineering at room 33, Commercial block, Salt Lake City, Utah. His experience of the past 17 years has been in the mines, mills and reduction works of Pennsylvania and the South, Michigan, California, Utah, Idaho and other parts of the West.

C. L. Hastings, formerly Pittsburg sales agent of the Bethlehem Steel Co., has accepted a position with the Pittsburg Gauge & Supply Co. in charge of sales for its steam specialties. He is succeeded by E. S. Knisely, of Bethlehem.

Robt. Campbell, of Gadsden, Ala., has been placed in charge of the plants of the Central Foundry Co., located in Bessemer and Gadsden. The Gadsden plant has not been in operation for some time, but will be started at an early date. Mr. Campbell is mayor of Gadsden.

James Boyle has succeeded W. H. Kelly as superintendent of the foundry of the Buckeye Engine Co., of Salem, O.

H. W. Taylor, of the firm of N. & G. Taylor Co., of Philadelphia, manufacturer of tin plates, sailed from New York, Aug. 9, on the Kaiser Wilhelm II, for an extended trip abroad.

Mr. Schwab confirmed the report that out of his private fortune he has been making good the losses of his personal friends incurred by the collapse of the shipbuilding trust. "I have already paid out to my friends $2,000,000 of my own money," he said.

Frederic B. Stevens, of Detroit, announces in his "Drummer," a four-page paper 8½ x 11 inches, "published partly for the benefit of the unsuspecting foundryman," the agency for Michigan for the American Pig Iron Storage Warrant Co. In addition to foundry topics the paper discusses the business situation and the prospects for pig iron in a style peculiar to the publisher.

The repair shops of the American Refrigerating Transit Co., St. Louis, including 65 refrigerator cars, burned Aug. 9. The loss is $300,000, fully insured. The fire is supposed to have been caused by a spark from a passing engine. The cars destroyed were valued at $1,000 each. In the building were machinery, molds and tools, which the fire ruined.

The steamer Augusus B. Wolvin this week, by carrying 10,245 gross tons of ore to Erie, beat her own record of 9,945 gross tons, unloaded at Conneaut July 25.

A concrete smokestack, the first in Cincinnati, and the third in the United States, has been completed at the plant of the American Book Co., Cincinnati. It is 150 ft. high and was built at the rate of 2½ ft. a day, to give time for thorough drying. The Ferro-Concrete Co. had the contract.

J. F. Davidson of Racine, Wis., has been elected president of the American Skein & Foundry Co., succeeding J. G. Johnson. The other officers elected are as follows: Vice president, George W. L. Laughman, South Bend, Ind.; secretary and manager of the Columbus plant, Frank E. Stoneman; treasurer and general sales agent, W. B. Mitchell, Chicago.

The August outing of the New England Foundrymen's Association is announced for Thursday, Aug. 11, at Providence, R. I. The Squantum Club is headquarters for the day and a shore dinner the principal feature.

OBITUARY.

Verdine T. Palmer, president of the Palmers & DeMooy Foundry Co., Cleveland, died at his home in that city, Aug. 4, after a long illness with tuberculosis. Mr. Palmer was born in Warrensville, O., Jan. 1, 1843, and had been president of the Palmers & DeMooy Co. since its organization in 1881. He was a brother of George H. Palmer, who was secretary and treasurer of the same company until his death last December. Mr. Palmer was also interested in the Great Lakes Towing Co., in the Minch Transportation Co. and in other business enterprises.

I. N. Topliff, president of the Topliff Mfg. Co., manufacturer of carriage hardware, Cleveland, died suddenly, Aug. 7, at the home of his daughter in Syracuse, N. Y. Mr. Topliff was born in Mansfield, Conn. in 1833 and has been a resident of Cleveland since 1879.

Robert C. Trivett, of Rogers, Brown & Co., Cincinnati, died suddenly on Wednesday, Aug. 3. The deceased was a son of Robert C. Trivett Jr., who with W. A. Rogers began business under the name of Rogers & Trivett in 1880. Mr. Trivett died shortly after the forming of this connection and Archer Brown came into the firm, the name being changed to Rogers, Brown & Co.

John F. Starr, president of the First National bank, Camden, N. J., died Aug. 9, aged 86 years. In 1862 he was elected to congress and was re-elected in 1864. He was the founder of the Star Iron Foundry, now the Camden Iron Works.

The monthly report of the Bessemer Pig Iron Association for Aug. 1 shows the greatest amount of idle capacity of blast furnaces using Lake Superior ores, in any month this year with the exception of January, which was 64½ percent. On Aug. 1 it was 41 percent. It is anticipated that the showing for the present month will be more favorable.

The plant of the Emlyn Iron Works, Chicago, has been sold to John R. Walsh, president of the Chicago National Bank, for $150,000. The bank was a large creditor of the company. It is expected that the plant will soon be put in operation.

W. P. Lemley has been placed in charge of the Pittsburg office of F. R. Phillips & Sons Co., room 518, Park building. Owing to the death of F. R. Phillips Sr., F. Rees Phillips, who was formerly in charge of the Pittsburg office, and who is well known to the iron and steel trade of that district, has taken charge of the Philadelphia office, while W. Vernon Phillips, who was in charge of that office until the death of his father, has gone to London, England, to manage that office.

The sale of the bankrupt Model Gas Engine Co., Auburn, Ind., to John W. White, of Fort Wayne, for $50,100 has been approved by the referee. Mr. White and Max B. Fisher, also of Fort Wayne, will organize a new company capitalized at $250,000, to conduct the business.

Rail Mill No. 2 of the Lackawanna Steel Co., Buffalo, turned out its first rails last week. Its product is light rails.

The plant of the Ellis & Lessig Steel & Iron Co., Pottstown, Pa., was sold at public sale Aug. 3 to George B. Lessig for $105,000. The company will be reorganized.

The Hannah and Hall furnaces of the Republic Iron & Steel Co. are to be blown in within the next ten days. The Hall stack has been off for repairs and as soon as they are completed the furnace will again be in operation.

Charles G. Smith, of the Charles G. Smith Co., Pittsburg, dealer in machine tools, grinding machinery, emery wheels and accessories, reports that his company's business during the months of June and July has been the largest in its history. Several large contracts for machine tools recently placed in the Pittsburg district have been taken by this company, and the outlook is reported exceedingly bright for the fall demand.

The blast furnace and washed metal plant of the Youngstown Steel Co., Youngstown, O., resumed operations this week.

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A. I. FINDLEY, - - - - - EDITOR.
ROBERT I. CLEGG, - - EDITOR MACHINERY DEPARTMENT.
GEORGE SMART, - - - ASSOCIATE EDITOR.

CHICAGO: 1164 Monadnock Block, Geo. H. Griffiths, Manager.
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August 11, 1904.

THE PROBLEM OF STEEL PRICES.

However the members of the billet pool regard the conversion deal involving 110,000 tons of Bessemer pig iron, as reported in these columns last week, the significant fact is that a large buyer of steel has secured nearly a year's supply at $4.25 less per ton than the delivered price of the pool. Even if the transaction be an admitted violation of the billet agreement, it only involves doing indirectly, on a large scale, and with a deeper cut, what has been done directly in a smaller way for months. The last meeting of the pool reaffirmed prices, though it was well known on all hands that $23 at Pittsburg for 4 x 4 billets was from $2 to $3 above prices made in actual transactions, and that every member, either by evasion or direct price cutting, had sold steel below the established price. The point that prevailed with the steel companies was that not enough business offered to carry prices far below the original level and therefore to reaffirm it and wink at the evasions was betetr than to make a formal reduction.

The establishment of $6 as the "spread" between Bessemer pig iron and Bessemer billets is not alone of significance to the steel market, after a long period in which the raw material of a variety of independent finishing plants has been forcibly held above its natural alignment, but the transaction of last week suggests what may happen in certain finished lines when tonnage becomes sufficiently tempting.

The argument that has long been offered in justification of present prices of rails, plates and structural shapes is that as consumers were in no buying mood, reductions of prices would not start business. This has been demonstrated in cases where sliding scale contracts on finished material exist, based on the price of Bessemer pig iron. The lower prices of recent months on the plate contract of the leading steel car interest have not greatly stimulated business in steel cars, though prices of such cars have come down materially. In billets, also, consumers having sliding scale contracts have not been able, even with the declines in Bessemer pig iron, to specify at anything like their contract rate. But the inference from the reasons steadily assigned for the maintenance of prices on steel and important finished products has been that when the railroads and the promoters of new construction enterprises seriously entered the market it would then be in order to fix prices at which business would be done freely. How the problem is to be practically worked out rests largely with the important interests that have undertaken for a good many months to determine the market prices of rails, plates, shapes and steel bars. It is generally agreed that with a national election pending no large "new business" in iron and steel will be placed, that is, business resulting from new undertakings. Late in the year shipbuilding may start again, and early in the new year figuring on structural work may again become active. It is known that even with tonnage on the lakes in apparent excess, as it has been this season, there is capital ready to go into new vessels of modern capacity if builders can name prices based on a material reduction in plates.

As high prices for commodities—and chiefly a high price for a given amount of labor—have had much to do with bringing about present industrial conditions, it will be but following the well-established cycle if the next period of prosperity be ushered in by low prices for commodities. It has always been true, and will continue to be, that after a period of intense activity has been interrupted, the ultimate consumer waits for a considerable reduction in prices before again becoming a large buyer. Cheap money precedes business revival after a halt, but cheap money will not be borrowed for investment in dear commodities.

Whatever formal notice may be taken by the billet pool of the recent conversion deal, the fact remains that a new price has been established for steel; and if other producers of finished material are able to get steel at substantially the same price they are in a better position than heretofore to compete with large producers of sheets, tin plate, bars and wire products. In these lines the effect of the deal will be in evidence from this time on. What the trade will be more particularly interested in is what sort of a readjustment the steel powers will make, and when, in those products in which the output is mostly controlled by large companies. Billets have been ostensibly the basis of the elevated price structure of the past four years. The question now is, with billets down, what is to become of the structure?

NOT A SIGN OF PROSPERITY.

A New York paper has the headline "Signs of Prosperity" over a statement of iron and steel exports through the port of New York in July, the total being represented as 75 percent greater than like shipments in June from the same port. Large exports of iron and steel are distinctly not signs of prosperity. Much of the steel shipped from New York as billets and sheet bars was sold at less than $15 at mill, some of it close to $14. To find any parallel to such prices in the case of crude steel sold for consumption at home we must go back to the deepest point of the depression that preceded 1898. The relatively heavy exports of the past six months in iron and steel are signs of distress, as exports of crude steel or of pig iron from this country will always be.

The day may come when a profit can be made by our steel makers on certain forms of finished material shipped to markets which competitors in other steel-making countries must pay considerable freights to reach. But at today's level of wages, or at any approximation to the present schedule in our steel works, there is only the inducement of more regular operation of mills to lead to the booking of export business. For the United States Steel Corporation to ship something like 1,000,000 tons of crude and finished steel out of the country in 1904 means that its less economical mills can be closed down for several weeks at a time and production concentrated in those with lowest producing costs. Thus it was the foreign orders on its books that permitted the starting of the Homestead Steel Works in full last month, the adjustment of schedules among the Edgar Thomson, Duquesne and Homestead works being greatly facilitated by this supplemental tonnage. But with pig iron production, as at present, at a rate only about two-thirds that for the year 1903, it is a great stretch of optimism that reckons the 8 percent of current pig iron output that is going abroad in the form of finished or semi-finished steel, among "signs of prosperity."

POINTS IN THE PIG IRON STATISTICS.

It is noteworthy that while the production of foundry and forge irons in the first half of 1904 was 375,000 tons less than in the second half of 1903, the output of Bessemer iron was 21,000 tons greater and that of basic iron 225,000 tons greater. The explanation is to be found, no doubt, in the fact that while our steel works had an outlet abroad for their product the foundries and iron rolling mills felt the full effect of the falling off in domestic business. And with the well-known slackness in demand for plates and structural shapes in the past six months, the increase of basic pig iron production may mean something more than the exportation of a considerable tonnage of basic billets and sheet bars. It may indicate further increase in the use of pig iron and direct metal in the manufacture of basic steel and a progressively decreasing employment of scrap at basic works. As the official statistics of steel production are not gathered for half-year periods, no definite statistical verification of this supposition is available; yet from what is known of the practice at important works it can be said that the advance in scrap prices in recent years and the economies of direct metal have worked together to modify the proportions of scrap and iron. Smaller works with a good local supply of comparatively cheap scrap naturally rely largely on scrap.

The table below shows the changes in production of the various classes of pig iron in the last five half-year periods:

PRODUCTION OF PIG IRON BY HALF-YEAR PERIODS—GROSS TONS.

	1st half 1902	2d half 1902	1st half 1903	2d half 1903	1st half 1904
Bessemer	5,105,932	5,287,226	5,480,619	4,509,289	4,530,946
Basic	1,053,274	985,316	1,203,803	896,923	1,061,901
Foundry and forge	2,649,368	2,740,181	3,022,945	2,955,673	2,580,591
	8,808,574	9,012,733	9,707,367	8,301,885	8,173,438

The increase in production of basic iron was more than accounted for by the increase in Allegheny county and in other counties of Pennsylvania. Allegheny county production advanced from 364,205 tons in the second half of 1903 to 542,398 tons in the first half of 1904, and in other counties of Pennsylvania the increase was from 186,837 tons to 261,200 tons. Ohio, Missouri and Colorado, on the other hand, fell from 128,769 tons to 76,225 tons in spite of the starting up of the basic open-hearth plant at Pueblo. It would seem that steel works in the Pittsburg district that in 1903 were buyers of basic iron from merchant furnaces in Ohio, largely made their own basic pig in the first half of this year.

Known conditions in the foundry industry make the falling off in production of foundry and forge grades, as shown by the table, no surprise. The figures of production, moreover, scarcely represent the full amount of the falling off in consumption of foundry iron in the past six months, the accumulations of stocks being an additional factor. Unsold stocks of charcoal iron alone increased from 120,656 tons on Dec. 31, 1903, to 192,313 tons on June 30, 1904.

The present steel billet arrangement dates from July, 1903, when a schedule of prices was agreed upon at New York based upon $27 at Pittsburg for Bessemer billets. In November, 1903, the price was reduced to $23, after various forms of evasion had weakened the original agreement, and in the past six months the $23 basis has been impaired in various ways. For two years and eight months previous to July, 1903, the steel market was left to take care of itself, though there was nominally an organization. The highest price paid for billets in recent years was in September, 1899, when small lots sold at $39 Pittsburg. From that time the market declined steadily and a year later sales were made at $17.50 Pittsburg. In November, 1900, the billet association established a minimum of $19.75, Pittsburg, and prices advanced from that time until $35 was reached in June, 1902. During the life of the present association the influence of the smaller open-hearth plants has been increasingly felt, the declining price of pig iron enabling them to sell billets at from $1 to $2 below the association price and still realize a fair profit.

The pattern shop of the Albion Iron Works, Victoria, B. C., was damaged by fire on Aug. 9. A large portion of the building, together with the valuable machinery which it contained, was destroyed. The fire in the shop was carried in the form of sparks to the neighboring buildings, and a large number of dwelling houses were destroyed.

The Washington Coal & Coke Co., Dawson, Pa., with general offices in the Conestoga building, Pittsburg, in charge of N. P. Hyndman, reports all of its ovens in operation at present, while the company's coal mines are operating at their fullest capacity. Very few of the plants in the Connellsville region at present are operating at more than half their capacity.

In the week ending Sunday, Aug. 7, the furnace of the Everett Furnace Co., Everett, Pa., turned out 1,432 tons of iron. This is the biggest week's output yet reached by this stack.

Lack of orders at the works of the Pullman Palace Car Co., Pullman, Ill., has resulted in the laying off of more men. About 1,200 men have been laid off since June 1. There are now about 4,500 men at work. The number will be still further reduced unless new orders justify a continuance of the present force.

The Labor Situation.

REDUCTION IN CINCINNATI FOUNDRIES.

Cincinnati foundrymen, with whom are associated in wage agreements the foundrymen of Covington and Newport, gave notice to the Iron Molders' Union in June that the agreement which expired on July 31 would not be renewed. This is in line with the action taken in the past few months in all cities where members of the National Founders' Association and other foundrymen, organized in local associations, have for several years made annual agreements with the union. Last week notices were posted in a number of Cincinnati shops that on and after Aug. 15 foundrymen would pay competent men 30 cents an hour for floor molding and 28 cents an hour for bench molding, these rates amounting to a reduction of 20 cents a day from the wages that have prevailed in the past year, which were $3.20 and $3 respectively. The molders are reported to have construed these notices as indicating an intention on the part of the foundrymen to operate open shops, and at a meeting of the locals it was decided not to accept the new terms. However, the local employers' association and representatives of the molders were in conference last week and had partly arranged for another meeting this week. It is thought that the action of the molders' meeting may preclude the holding of a national conference over the matter at issue. The local newspapers, after interviewing officers of the molders, predict that a strike will take place in the foundries of the three cities on Aug. 15. The union molders in Cincinnati, Covington and Newport number 1,200, outside of the stove molders, who treat direct with the Stove Founders' National Defense Association.

LOCKOUT OF BUILDING UNIONS IN NEW YORK.

A general lockout of union employes of the building trades in New York went into effect Aug. 8. The number of men affected is estimated at about 50,000. Half of these are skilled workmen, the remainder being laborers whose employment depends upon the skilled workers. The lockout, which was ordered by the Building Trades Employers' Association, is a result of alleged violation of an agreement entered into by the unions and the association about a year ago to submit all questions to arbitration. Many strikes have been ordered against members of the association during the past few weeks and the lockout order followed. The lockout includes all the unions belonging to the Building Trades alliance, between which body and the Building Trades Employers' association the war is being waged, except some of the plasterers and some of the painters.

Charles L. Eidlitz, president of the Building Trades Employers' Association, is quoted as follows: "We have done everything in our power to make the men realize that they are allowing a former type of leader to get control of their unions. We have exercised patience to the limit. We greatly regret that the public should be inconvenienced, but all employers in the building trade are firm in their determination not to go back to the old sympathetic strike, with its graft accompaniments of a year ago. No man, be he plumber, carpenter or electrician, can accomplish the end which the Building Trades Alliance has in mind, that is, the calling of sympathetic strikes, so long as the Building Trades Employers' Association is in existence. The members of the Building Trades Employers' Association are not in favor of the open shop. If they were, they would not be making the fight on the present lines. Our association insists on doing business with labor unions, but it absolutely requires that business must be done in a fair-minded and above-board manner, and will not tolerate any interference by so-called but self-selected labor agitators."

NATIONAL METAL TRADES ASSOCIATION NOTES.

The monthly meeting of the New York Metal Trades Association will be held Thursday, Aug. 11. At a recent meeting of the association the subject of payment for overtime of boilermakers was referred to the executive committee with instructions to report at this week's meeting. Last week reference was made in this column to the decision of the executive committee of the American Federation of Labor on the subject of jurisdiction over work as between the boilermakers and the structural iron workers. That decision gives stacks to boilermakers. Nothing was said, however, regarding flues. The Riter-Conley Mfg. Co., of Pittsburg, is employing boilermakers to put flues, lined with brick, in the Fifty-ninth street power house, New York. The structural iron workers claim this work, not because it is given to them by the decision, but because the opinion has been expressed by the Building Trades Employers' Association that all work not under pressure should be given to the structural iron workers. The fact is that the structural iron workers understand that the boilermakers' union is out of business and it looks as though they were taking advantage of this condition, to secure all the work they can. This matter is now the subject of negotiations for settlement.

The grand lodge of the International Association of Machinists has made an imperative call on all members for an assessment of $1. The money will be spent to carry on the strikes now in progress in Chicago against the members of the National Metal Trades Association and the Chicago Metal Trades Association, also to carry on the strike against the Santa Fe road.

From time to time in the past year the establishment of labor bureaus has been discussed by the New York Metal Trades Association. Such bureaus are now in successful operation in Boston, Worcester, Springfield, Hartford, New London, Bridgeport, Trenton and Philadelphia. In many of the large manufacturing centers of the West similar bureaus are maintained. It is the opinion of members of local metal trades associations where such bureaus are in operation that they are the most valuable feature of their associations. In fact, they are considered indispensable. This is another subject that will be considered at the New York meeting on Thursday.

During the month of July at Pittsburg the skilled laborers discharged exceeded those employed by 60.9 percent while in June the number of men discharged was greater than of those employed by 55.4 percent. The totals from Jan. 1 show that 23.9 percent more skilled laborers have been laid off than employed by members of the association, every month showing some loss excepting January and May.

Although picketing is still being continued about the plants of several of the association's members in Chicago, the effective injunctions and vigorous prosecutions of violations of the law make this picketing of such character as not to interfere in the slightest degree with the operation of the shops. Thus ends a strike in less than 60 days' time which undoubtedly a few years ago would have been won by the union and would have placed the manufacturers of Chicago at a very decided disadvantage.

LABOR NOTES.

Notice of a 10 percent cut in wages of all departments was posted Aug. 4 in the plant of the Worthington Pump Works, Elizabeth, N. J., to go into effect Aug. 17.

There will not be a strike of the Ashland, Ky., steel workers on account of the reduction in wages at the plant of the Ashland Steel Co. The employes have decided to accept the 10 percent reduction. The plant has resumed operations.

The employes of the Stark Rolling Mill Co., Canton, O., went on a strike last week against a reduction in wages. About a year ago the men now on a strike were affiliated with the Amalgamated Association and at that time, when a strike was declared the majority of them returned to work, breaking away from the association. A few of the men, however, remained out, thus retaining the charter and now that they have gone out again they have been reinstated as members of the Amalgamated.

The I. & E. Greenwald Co. and Ehrhardt & Co., Cincinnati, have notified molders in their employ that wages will be reduced 20 cents a day, commencing Aug. 15.

The striking boiler makers of San Francisco and San Luis Obispo have resumed work. The strikers will be taken back, but non-union men will not be discharged.

The Emerson Steam Pump Co. has removed its general office from Washington, D. C., to the factory at Alexandria, Va.

TRADE PUBLICATIONS.

The new catalogue, No. 39, sent out by the Newton Machine Tool Co. Works, of Philadelphia, illustrates different sizes and designs of cold saw cutting off machines. The sizes enumerated are adapted to the widest range of work and the experience of the firm with over twelve hundred machines has been freely utilized in the new designs. These machines range from a small bar saw with a capacity of 2 inches up to a large machine for engine cranks and forge stock with a capacity of 21 inches. The tools illustrated are adapted to the cutting of round and square stock, I-beams, channel bars, etc.; also armor plate, nickel steel and gates or risers on steel castings.

The preservation of ships by electrically operated doors and hatches is the burden of Bulletin No. 8, from the "Long Arm" System Co., of Cleveland. In case of emergency the "Long-Arm" system closes its power-doors and power-hatches from a central station on the bridge of a ship, just as if the officer there could reach out and place his hand on each individual door or hatch; it reaches out to save the ship before the collision happens; it saves the ship by perfecting the ship's cellular structure (stopping up the holes in the bulkheads), so making her unsinkable; it does this without endangering anyone by sudden closings, and in such a manner that the power remains with the man at any door to reopen it quickly for escape or for passage on duties, the door reclosing automatically. Just how this is accomplished is set forth with considerable detail and a number of informing halftones.

A card from the Cleveland Gear Works, Inc., of Cleveland, has reproductions of standard gear templates from 4 to 48 pitch, involute teeth only. These templates are printed from cut gears and are correct. Both diametrical and circular pitches are given.

The Worthington steam-hydraulic accumulator is described in Bulletin 100, published by Henry R. Worthington, of New York. The device consists of an ordinary steam cylinder combined with a ram cylinder similar to that of a weighted hydraulic accumulator and is applicable to all purposes requiring the storage of water under high pressure. Its advantages over the weighted accumulator are that it is cheaper and occupies less room, and is free from the shocks and fluctuations of pressure due to the momentum of the heavy weights commonly used on accumulators.

New Car and Locomotive Orders.

The following companies have ordered cars from the American Car & Foundry Co.: Minneapolis, St. Paul & Sault Ste. Marie, 200 box cars; the St. Louis & O'Fallon Railroad Co., 200 steel gondola cars; Buffalo Mercantile Co., 100 flat cars; the Pittsburg Provision & Packing Co., 12 freight cars; miscellaneous parties, 22 cars of various types. The Pullman Co. has received an order from the Norfolk & Western for 20 coaches. It is reported that the Denver, Northwestern & Pacific Railway Co. is in the market for 10 passenger coaches and 500 freight cars. The Western Pacific Railway Co. is in the market for 200 ballast cars. The South Buffalo Railroad Co., whose tracks connect the Lackawanna Steel Co.'s plant with railway lines entering Buffalo, has placed an order for 100 flat cars with the American Car & Foundry Co.'s Buffalo shops. The Buffalo & Susquehanna railroad has ordered 250 gondola cars and 150 side dump coke cars from the Pressed Steel Car Co.

The Northern Pacific R. R. has, it is reported, placed an order for 31 locomotives, 26 freight and 5 passenger, with the American Locomotive Co. The Atlantic Coast Line is having 15 locomotives built at the Baldwin Locomotive Works. The Nashville, Chattanooga & St. Louis is having four locomotives built at the Baldwin Locomotive Works. The Chicago & Western Indiana is about to order three mogul locomotives and three suburban locomotives.

The sheriff at Celina, O., has closed the Hanika Iron Works of that city to satisfy a judgment of the Commercial Bank Co. The city gave this concern $19,000 to locate in Celina and is greatly disappointed by the failure.

LAKE SUPERIOR IRON MINES.

The strikers at the Fayal mine, Eveleth, Minn., notified Supt. Trezona on Aug. 4 that they would give him until 8 o'clock in the evening to leave town. The superintendent refused to go and 50 deputies were sworn in to guard him and the property. Mr. Trezona's house was guarded all night and although an attack was expected, there were no signs of violence and none has since taken place.

The Thomas Furnace Co., of Milwaukee, lessee of the Hiawatha mine at Stambaugh, has shut down its furnace and is repairing and remodeling it. It is expected that as soon as the work is completed the mine will resume operations. This, however, will not likely be until late in the fall, as there is a large stock pile that will have to be shipped out.

Pickands, Mather & Co., of Cleveland, are making preparations for the shipment of the large stock pile at the Mikado mine. This firm is sinking the Windsor shaft and has a steam shovel at work at the Carey.

The mines of the Hibbing district a few days ago shipped 85,000 tons in 24 hours. This is thought to be the largest single day's shipment ever made from the mines of that locality. All the mines are working steadily and it is now thought that the season's output will not fall far short of that of last year. The Stevenson, Mahoning and Burt, the three big open pit mines of the district, are working exceptionally strong this season.

Between 250 and 300 men employed by the Drake & Stratton Co., at Eveleth, Minn., went on strike Aug. 1, and at the same hour about 150 walked out at the Killorin-Philbin Works. The men, who are common laborers, have been receiving $1.60 and demanded $1.75. The stripping contract at Eveleth has been closed down on account of the strike. Owing to the strong demand for farm hands in Western Minnesota and the Dakotas, miners do not feel compelled to work for the wages they have been receiving.

John H. Jacobs and Thomas H. Tracy have completed the transfer of their rights in the north half of Section 9 49-33, Baraga county, Mich., to the Consolidated Bessemer Iron Co., which is in a fair way to develop a valuable mine on the property. The scene of these operations is the same section on which is located the old Taylor mine, from which over 30,000 tons of ore were shipped twenty or more years ago. The present explorations, however, have no connection with the old Taylor, and the deposit being proved up is something entirely new. Messrs. Jacobs and Tracy took hold of the half section in April, 1903. Over twenty test pits have been put down to depths averaging from 25 to 30 feet, and nineteen of the number showed hematite ore of good grade. The overburden is sand and gravel. The company is now engaged on a tunneling operation.

It is proposed to place the stock of the National Steel & Wire Co., consisting of $2,577,800 preferred and $2,993,700 common, into a voting trust for three years. H. E. Huntington, Ogden Mills and Henry W. Munroe will act as trustees. The board of directors recently adopted a resolution declaring it to be to the best interests of the stockholders that a voting trust be created in order that the control and direction of the affairs of the company may be in the strongest possible hands during the next three years and its business maintained on a firm basis.

Capt. Thomas J. Spencer is moving a plant of machinery to his exploration near Lake Fuma, Menominee range, Michigan. At present he has a shaft down 70 ft. and he will sink an additional 40 ft. A cross-cut section will then be started. Capt. Spencer considers the exploration a most encouraging one.

Two judgments, aggregating $5,600, were obtained last week against the Diamond State Steel Co., Wilmington, Del. Suits have also been commenced against the company by the Sloss-Sheffield Steel & Iron Co. and the Somerset Coal Co. The company hopes to avoid a receivership.

The plant of the Ashland Steel Co., at Ashland, Ky., is in operation this week.

Observations on Cast Iron.*

BY J. E. JOHNSON JR., LONGSDALE, VA.

Mr. West has observed that plates cast from direct metal of a certain composition could be planed, whereas this would have been impracticable with cupola metal of like composition; that furnace metal has more "life" (*i. e.*, fluidity, or a higher temperature) than cupola metal; that it throws out much "kish," etc. And he suggests that blast furnace managers may throw further light on the greater softness of direct metal castings. Perhaps such light may be furnished to some extent by the present paper.

The difference between cupola metal and furnace or direct metal is, first of all, in the lower average sulphur content of the latter. It has been proved by experiment that iron increases in its content of sulphur to a considerable extent with each remelting. More than thirty years ago Fairbairn showed that a certain iron after remelting 18 times had only five-eighths of its initial tensile strength and stood one-third of its original deflection, though there had been a decided increase in both up to the twelfth remelting. He did not show the cause of these results, but they undoubtedly were due jointly to increase in the content of sulphur and combined carbon.

It is easy to calculate that, if iron be remelted with a coke containing a normal quantity of sulphur, say 1 percent, with a melting ratio of 10 to 1, and if only half of the sulphur goes into the iron, the increase in the sulphur content of the latter will be 0.05 percent, which, according to the usual specifications, is the maximum amount the iron is permitted to contain, as it comes from the furnace.

The reasons for the higher heat of the furnace metal are: first, that the ascending current of gases has a much lower temperature in the cupola than in the furnace because of the use of cold blast in the former. (This might be overcome in practice by the use of an excessive quantity of fuel, but it would require more than would be commonly supposed); and second, and more important, that in the cupola the iron is exposed to the hot gases for a much shorter period, and is consequently unable to approach as closely to the temperature of the gases as it does in the furnace, to say nothing of the temperature being lower in the former than in the latter. Mr. West's experience in making workable castings from furnace metal of a silicon content which if present in iron cast from the cupola would put machining out of the question, and his contention that the hotter the metal is poured, the softer the casting, may best be considered together, as they are so closely related.

The experience mentioned can be confirmed without doubt or hesitation. It is, and has been for years, the practice of the works with which I am connected to make, for repairs, as well as for new construction, all castings within the reach of their molding facilities, directly from a furnace producing "basic" iron, with the silicon guaranteed under 1 percent and the sulphur under 0.05 percent. The iron would perhaps average, the year round, sulphur 0.03 and silicon 0.7 per cent; and yet there are comparatively few days in the year when the ordinary run of castings may not be made without fear of their being too hard to be machined. Of course, when the furnace produces white iron showing white clear through the pigs (which are cast in chills), it is necessary for the foundry to work on castings which do not require to be machined. On the other hand, should the iron contain much above 0.09 percent of silicon, difficulty is experienced in preventing holes and soft places in the castings, caused by the deposition of graphite or "kish" during or after pouring. "Kish" may be defined as consisting of loose particles of graphite, either thrown off into the air, or gathered on or near the surface of castings in aggregates so dense as wholly or largely to exclude the iron. In this paper, the term graphite, as distinguished from kish, means the particles more or less regularly disseminated and completely enclosed in the iron. In substance, apart from their mode of occurrence, the two are of course identical.

The best way to mitigate or prevent this trouble, which is sometimes very annoying, is to pour the iron very hot when making pieces of small or moderate size. The effect is to chill the metal from a high heat by contact with the cold mold and reduce it to the solid form as quickly as possible, thus preventing, to a great extent, the formation of graphite while the iron is molten, which gives rise to the kishy places. The graphite formed after solidification is distributed more or less uniformly throughout the metal; whereas, if the metal is allowed to cool to some extent before pouring, graphite begins to form within it, and separates out at eddies and high points of the mold, with objectionable results.

It is impossible to discuss this subject satisfactorily without making use of the well-established fact that cast iron being a member of the same series as steel, the principal effects in it are due, as in steel, to the quantity of combined carbon it contains. If the graphite, which is merely enmeshed in the cast iron, were absent, the latter would be, in fact, an impure steel, containing in general more silicon and (excepting Bessemer pig) more phosphorus than ordinary steel. This view was urged by me at some length in a paper published about four years ago, and was soon after expounded by Prof. Howe in such a way as to leave no room whatever for doubt.

The acceptance of this view renders available for the study of cast iron an enormous amount of material gathered from both practical and theoretical sources through many years, for the solution of problems presented by steel, in fact the work done upon steel furnishes a solid foundation for the study of cast iron. This, indeed, seems quite the natural order, since it proceeds from the simpler to the more complex compound.

A chart of the "freezing-point curves" of the iron carbon system, such as those of Backhais-Roozeboom and Roberts-Austen, shows that, with a pure cast iron containing more than about 4.3 percent carbon, there is a range of temperature within which carbon must separate out in the form of graphite before solidification takes place; this range of temperature being closely proportional to the excess of carbon above the quantity mentioned, roughly 100 degrees F. for each 0.5 percent carbon.

If, then, we had to deal with a pure iron containing, say, 5 percent of carbon, it is obvious that carbon is considerable quantity would have to separate out of the iron during cooling in the molten condition, and, naturally, that some of it would pass off into the air, especially in the ordinary operation of casting from a furnace, in which the running of the metal affords every opportunity for the liberation of this graphite. But, as there is little or no iron made containing 5 percent of carbon, this explanation alone is insufficient.

The diagram of freezing point curves referred to shows that with all pure cast irons the separation of graphite continues for several hundred degrees below the point of solidification; and it has been proved by direct experiment that silicon exercises a powerful influence in assisting or compelling the formation of graphite in this temperature range (a fact also well known in practice); also that it lowers very markedly the temperature at which the separation of graphite can begin, and reduces the quantity of combined carbon with which the iron can be "in equilibrium." That this action of silicon on the formation of graphite persists above the point of solidification is proved clearly by its action in relation to suddenly-cooled or chilled castings. It is well known that in the presence of more than 1.5 percent of silicon it is impossible to obtain any chilling action, and that, other things being equal, the strength of this action is inversely proportional to the quantity of silicon present below that amount.

So much being established, it may be taken as certain that silicon has the same effect in lowering the temperature and the percentage of combined carbon at which the cast iron is in equilibrium above, as well as below, the point of solidification. It thus lowers the percentage of carbon above which graphite is forced to separate out from the still molten iron, and this accounts for the observed fact that, at a furnace running on foundry iron, the cast-house is often full of kish, while at a furnace running on low silicon iron this is seldom seen, though the carbon content of the iron is as high (or higher) in the second case as in the first, and the iron may show a beautiful gray fracture when slowly cooled.

Many interesting facts have been developed as a result of

*Prepared for the Atlantic City meeting of the American Institute of Mining Engineers.

using iron the composition of which is at the extreme limit permissible for foundry work. Castings are sometimes made from iron, of which it is known that the machining will be, at best, barely practicable; yet it is necessary to save them if possible. For such cases a very slow cooling has proved efficacious; the castings are buried in hot sand and kept there over night, or even for a whole day, if they are large, and able to hold their heat for this length of time. Of course, the slow cooling is practically identical with the annealing of tool steel, with the additional condition of the separation of graphite.

The reason for the absence of kish in ordinary cupola foundry work is, that the metal, having a temperature considerably lower than that of furnace metal, has to pass, in cooling, through a much smaller part of that range above the melting point, within which graphite is compelled to separate out. Consequently, there is little or no formation of graphite during the melted state, and hence no kish. This fact does not prevent the iron from being very graphite when cold, because, as shown by the freezing point curve, the separation of graphite continues for several hundred degrees below the temperature of solidification. It may be added that for each kind of cast iron there is a maximum of carbon which it can contain dissolved when it "sets," though much of this carbon subsequently passes into graphite in the solid state. Any excess above this limit will be expelled in the form of graphite while the iron is still liquid. This maximum represents, in fact, the eutectic of iron and carbon for that kind of cast iron. The limit of carbon for pure cast iron is 4.3 percent, as already stated, and diminishes with progressive increase of silicon.

If, for convenience, iron containing more than this amount of carbon be called supercarbonized, or (adopting the scientific term) "hyper-eutectic," and any increase in temperature above the melting point of the eutectic be called "superfusion," it may be said that "kish" is formed when a supercarbonized or hyper-eutectic iron is superfused.

It may be said that kish is formed by molten iron, while graphite is formed by solidified iron, and it must be noted that kish can be formed only when the quantity of silicon present is sufficient to cause the carbon dissolved in the iron to supercarbonize it, or constitute a hyper-eutectic solution. Thus, when first-class basic iron is cast in sand, it may have a most beautiful face and fracture which would cause it to be graded as No. 2 X; yet no kish will be seen flying in the cast-house. It is impossible to emphasize too strongly the influence of time in all these matters. This is well understood with regard to steel, but seems never to have been thoroughly realized with regard to cast iron, in which most of the changes common to steel occur, as well as those incident to the formation of graphite. The diagrams of freezing-point curves before mentioned, which show the cooling-curves and the internal changes of steel, are always based on the condition of slow cooling, therefore do not directly represent the effects of quick cooling.

The effect of quick cooling is to transfer a condition represented in such a diagram by the initial temperature to the lower point on the same ordinate which corresponds to the final temperature of the quick cooling, thus introducing conditions which diagram does not completely represent, especially if further cooling, at a slow rate, takes place.

Such a diagram, therefore, does not directly exhibit the results of the chilling effect of the mold on hot-poured metal. Yet it does show plainly that denying the time required for the separation of kish from the superheated metal increases the carbon content of the iron at solidification. This seems to me to indicate, further, that quick cooling raises the temperature of solidification, and consequently increases the range, both of temperature and time, during which graphite is formed after solidification. Hence a hot-poured iron tends to be less kishy and more graphitic than if poured at a lower temperature.

These conclusions are confirmed by practice. Hot-pouring to prevent the formation of kish has been mentioned already. It may be added that, of castings made from some kinds of furnace iron, those first poured from the ladle are entirely free from kish, while those poured last from the same ladleful are so kishy as to be objectionable.

So far as I know, these general facts and their fundamental relation to the accepted theory of the general subject have not been published hitherto. It is worth of note, in this connection, that hot-pouring tends to prevent the production of hard castings from relatively hard iron, and of kishy castings from relatively soft and kishy iron. This may explain the strong insistence of foundrymen upon "hot" iron. Concerning the formation of graphite, it must not be forgotten that, as Prof. Howe has pointed out, the important question is not how much graphite is formed, but how much combined carbon is left.

Observations of irons habitually low in both silicon and sulphur content make much plainer the action of the latter element than do those of irons further removed from the chilling point by the presence of more silicon; and it seems to me, as a result of several thousand such observations, that the harmful effects of sulphur have never been properly emphasized. So far as I know, a lower sulphur content than 0.05 percent is seldom or never specified in foundry or other standard varieties of iron, and yet an iron with 0.05 percent sulphur is no more to be compared with a similar iron containing 0.025 percent sulphur than coke-made white iron is to be compared with cold-blast charcoal iron.

At the works above mentioned, as at many others, it is the custom to take from every cast a small chill-cast sample (roughly 1.25 inches by 2 inches in cross-section by 7 inches in length), remove it from the chill-box when it has cooled to a dull red, quench it as quickly as possible and break it. When the furnace is running on basic iron of standard composition, these chill samples will show from the faintest line of white at the lower corners, with 1 percent silicon and, say, 0.02 percent sulphur to dead white with lower silicon and higher sulphur. Through a very large part of the range of analysis covering the best basic irons low in both sulphur and silicon, these samples are solid white, and their variations in fracture, according to the sulphur present, are astonishingly great to be covered by the single title "white." It is not necessary to go into a detailed description of these variations here. I will only say that the low-sulphur irons have a beautiful bright, very markedly crystalline structure (the crystals being long slim pyramids with their bases against the sides and bottom of the chilled surface and pointing toward the center), while the higher-sulphur irons have a structure increasingly flat and non-crystalline; and while the general surface of the fracture with low-sulphur irons is always approximately a plane perpendicular to the length of the sample, this is decreasingly so with higher sulphur, the fracture eventually becoming almost conchoidal. At what are considered very moderate sulphurs for foundry iron, beginning about from 0.05 to 0.06 percent with low-silicon iron, the sample becomes cracked in cooling, and at 0.075 percent sulphur, will frequently fall into many pieces at the lightest tap when cold, though, it should be said, this latter condition is apparently more marked at some times than at others, even though the irons contain identical quantities of sulphur, silicon and other elements, ordinarily determined.

That sulphur, however, is the principal cause of these variations of physical properties is sufficiently proved by the fact that with experience it becomes perfectly possible to estimate the sulphur in the iron by the fracture of its chill-samples, and, as a general thing, to come within 0.01 percent. of the laboratory determination.

With iron approaching 1 percent silicon the effects of sulphur are to some extent masked, but not completely. Its effect in reducing the size of the grain, increasing the depth of chill and blackening the color of the gray part of the fracture is plainly apparent.

That sulphur has an effect in producing a chill (throwing the carbon into the combined form), precisely opposite to that of silicon, is shown very clearly by a study of the chill-samples, but this is so generally understood that there is no need to elaborate it here; though it cannot be too plainly stated that silicon is not on that account a complete neutralizer of sulphur.

The exact internal effects of sulphur in steel have been clearly shown by Prof. Arnold and Mr. J. E. Stead, and there is little or no reason to doubt that the action is the same in cast iron. It may be well to recall here that this action,

briefly, is to form a very fusible iron sulphide which remains liquid long after the rest of the iron has solidified, and disseminates itself between the grains of the iron, thus severing or weakening their continuity. It is not to be expected that silicon, for which sulphur has little affinity, should neutralize such an influence, whatever its effect may be in opposing that of sulphur on carbon. This point is of much importance practically, for the reason that much foundry practice at the present time seems to be founded on the belief that silicon is a neutralizer of sulphur.

Since the quantity of sulphur in iron increases considerably at each melting, it is natural that scrap which has had at least one remelting will contain a higher percentage of sulphur, and therefore will have a more marked tendency to chill, than furnace iron; and as high-silicon iron will undoubtedly soften white iron, it is perhaps natural to assume that the addition of the former is all that is necessary to soften scrap. Undoubtedly such an addition will counteract, wholly or in part, the chilling tendency; but it does not follow that this remedy will neutralize all the other effects of sulphur. When it is remembered, moreover, that the action of silicon in preventing the formation of combined carbon is certainly completed at, if not below, 2 percent the wisdom of using mixtures which contain more silicon than this limit as they come from the cupola is open to question, especially as silicon is a hardener on its own account, and beyond this percentage a weakener also. Silicon, when present in greater quantities than 2 percent is also a great dirt-producer in castings. This matter of dirt-production does not receive much attention in general; but I feel confident that many sand-holes in castings are due to silica, produced by the combustion of silicon in the cupola, and remaining suspended in the metal until the latter comes to rest in the mold, and gives a chance for the silica to separate.

The cleanness of castings made from low-silicon furnace metal, as compared with those from ordinary cupola iron, would surprise those who have not witnessed the difference.

Just how far silicon neutralizes the evil effects of sulphur is one of the most important questions of foundry practice today, and should without doubt be investigated by some one able and competent to do it; preferably under the auspices of some engineering society. I recently outlined what I believed to be a satisfactory method of investigation, and I hope that something in this direction will be accomplished before long.

Not much can be done to remedy high sulphur in the iron after it has passed through the cupola. The addition of manganese in some form in the ladle is the only method which has been tried to any extent; and it has yielded good results in some cases, though its use is open to various objections of a practical kind, such as the high cost of ferromanganese, which is practically the only form of manganese available for the purpose; chilling of the iron in the ladle, if the ferromanganese is charged cold; or the cost of pre-heating it, if it is charged hot. Nevertheless, there are many cases in which it could be profitably used, care being taken not to add too great an excess, and thereby increase the percentage of manganese in the iron to a point where hardness would result.*

So far as I know, calcium carbide has never been used for this purpose; but it is well worthy of a trial. It compares favorably with ferromanganese in cost, while its combining power and its affinity for sulphur are much greater; moreover, it is an endothermic compound, and therefore its decomposition would impart heat to the metal. Moreover, calcium, being a powerful deoxidizing agent, would tend to remove any oxygen present in the form of iron oxide. The possibility of the presence of iron oxide in a highly carbonized metal like cast iron is strongly denied by some; but I am more and more convinced that it is present in white iron.

Much can be done, however, to prevent the absorption of sulphur by the iron in the cupola. The first step is, of course, to use iron and coke low in sulphur, the next is to use an iron containing considerable manganese, say from 0.75 to 1.5 percent since this quantity slags off the sulphur and prevents it from entering the iron. In the running of the cupola much can be done by slagging it freely, and there does not seem to be any reason why additions of lime should not be made in such quantity as to neutralize the extreme acidity of the slag. If from 1 to 2 lb. of limestone were charged for every pound of silica in the coke-ash, the slag would be very fusible as compared with blast furnace slags, but enormously more powerful in the removal of sulphur than one withtout lime. In a 10-ton heat with a melting ratio of 10 to 1 and coke containing 7 percent silica, there would be 140 lb. of silica in the charge, and 200 lb. of lime added to this would have a marked effect in reducing the sulphur-content of the resultant iron if at all excessive, at an utterly insignificant cost. A still more calcareous slag would be inadvisable, under the present conditions of cupola practice, because, with the cold blast used, a sufficient temperature would not be attained to melt it. But this brings up the question: Why are not cupolas blown with warm blast?

A calculation of the quantities of heat required and expended in melting iron, or an examination of the top of a cupola in operation, will show that there is plenty of available heat, which could be utilized to save fuel. It has been calculated that from 25 to 40 percent in fuel consumption could be saved by heating the blast; and this would permit the use of relatively calcareous slags which would reduce the sulphur content and give better iron—results opposite to those obtained in general practice, when any attempt to economize in fuel is made with cold blast.

The means of heating the blast could be very simple, merely some wrought or cast iron pipes located in an enlargement of the cupola stack and connected by return bends, with external joints out of reach of the fire. The quantity of air admitted at the charging door would give a simple means of controlling the temperature and thus avoid any damage to the pipes. The blast would pass through the pipes in series on its way to the wind-box, and could probably be heated as hot as desired without difficulty and without excessive cost for repairs. The pipes would be exposed to no danger of being burnt up when there was no air passing through them, because at such times the cupola would not be going to any extent worthy of consideration.

Many other phenomena concerning this interesting subject have come under my observation, but as these concern the production of cast iron (furnace practice) than its use, they are omitted from the present paper.

*Since this was written, I have heard of a method, developed in Germany, for removing sulphur by adding manganese-ore to the charge. This absorbs the sulphur and slags it off, very much as if the manganese were in the metallic state, but at less expense. I have no exact details of the process and its results; but it is said to have been successfully used in Germany.

Sept. 1 is the date now fixed for inaugurating dealings in pig iron warrants on the New York Produce Exchange. It is understood that the exchange has decided to adopt the rules proposed by its committee instead of those in force on the Pittsburg exchange, where dealings in warrants was authorized some time ago. The essential difference between the Pittsburg rules and the one proposed for New York is that the latter will require only one certificate calling for the delivery of a single standard grade of pig iron. The object of this is said to be to prevent warrant arbitrage operations between the Pittsburg Stock Exchange and the Produce Exchange in New York.

During the month of July there were 521,432 tons of iron ore put on the docks of the Illinois Steel Co. on the Calumet river, an average of nearly 17,000 tons per day. This record is said to be the greatest for the same period in the history of the plant. Part of the ore will be forwarded by rail to the mills at Joliet but the larger part will be worked up at the South Chicago plant.

In the United States court, at Wilmington, Del., Judge Edward G. Bradford has directed the receiver of the United States Shipbuilding Co. to sell the plant of the Harlan & Hollingsworth Co. in Wilmington and has appointed James P. Winchester, president of the First National Bank, special master to arrange for the sale. The minimum price set by the court for the sale of real estate is $550,000 and for the raw material $135,000.

CONTROLLERS FOR MILL TABLE MOTORS.

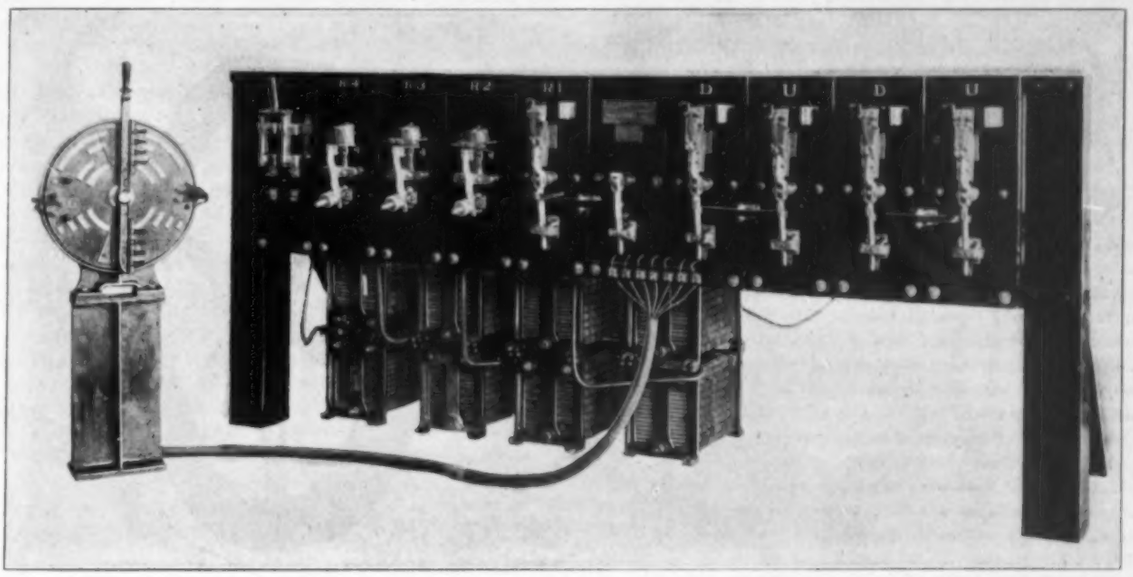
The type M. T. controller has been designed by the Electric Controller & Supply Co. of Cleveland to meet the special requirements of reversing tables in rolling mills. In the past a large amount of trouble has been experienced with the burning out of armatures and breakage of gearing where electric motors have been used to drive these tables, and in many instances steam engines have been employed for the purpose, whereas electric motors could have been used to great advantage had the proper controlling devices been available.

The greatest danger which occurs in the application of electric motors to this service, where any of the standard forms of manually operated controllers is used, lies in "plugging" the motor, that is to say, reversing the controller while the motor is running at a high speed. In analyzing the action of the motor during the period of reversal some surprising facts are developed. When the armature of a motor is in motion with the field excited it is generating an electromotive force which, under normal conditions, is opposed and nearly equal to the applied voltage. When the connections to the armature are suddenly reversed, as by reversing the controller, it is evident that the e. m. f. still generated by the forward motion of the armature is added to the line voltage, because it was opposed to the previously applied tension which has been reversed. Therefore, at the instant of reversal of the controller, the voltage available for forcing current through the windings of the motor, and whatever resistance may be in circuit will be the line pressure plus the voltage generated by the forward motion of the armature under the influence of the field existing at that instant. In the case of a shunt wound motor operating with constant strength of field the maximum voltage realized at the instant of reversal will nearly double that of the line. In the case of a series wound motor (which is the type of motor ordinarily employed for the purpose under consideration) a far higher voltage than the above may readily occur.

In general for the purposes of rapid acceleration a very large motor is used compared with the actual load to be driven which consists ordinarily of the friction of gears and bearings. This being the case, if the controller is left on the "full on" position for a few seconds, the motor armature will attain a very high speed. Take the case of a 50-h. p. series motor with a full load speed of 500 r. p. m. at 200 amperes, 220 volts, driving a table with a friction load of 50 amperes. If the controller was left in the "full on" position the armature would attain a speed of approximately 1,250 r. p. m. If now the controller were reversed to such a point as to limit the current to 200 amperes (full load), the armature running at 1250 r. p. m., with a full field corresponding to a speed of 500 r. p. m., would for an instant generate an e. m. f. approximately 2½ times its normal counter e. m. f., or say 500 volts which, with the line voltage of 220, would give 720 volts available for forcing current through the motor and resistance.

This is on the assumption that the controller has been reversed only far enough to allow 200 amperes to flow at the above voltage of 720. Necessarily the amount of current which will flow will depend on the amount of resistance left in circuit and will increase in compound ratio as the resistance is decreased. With at least 720 volts available it is very safe to predict that something would happen if the controller was very quickly reversed to the "full on" position. The happening is usually represented by broken gearing, a bent armature shaft and a badly scarred commutator, and in some cases the frame of the motor has been known to leave its foundation and attempt to relieve the armature by revolving in the opposite direction. In course of time with any ordinary form of manually operated and readily reversed controller an accident of this nature is likely to occur either from ignorance of the operator or his desire (very laudable in itself) to break records.

The facts justify the use of a special controller for the purpose. The first claim of the type M. T. controller rests on the fact that it entirely precludes the possibility of accident to the motor or gearing through "plugging" the operating controller. The operator may reverse his controller as rapidly or as carelessly as he sees fit without danger. The free operation of the controller is in itself a great advantage and should introduce a considerable saving in time when compared with the gingerly way in which the operator must handle a controller in fear of accident.



A NEW CONTROLLER FOR MILL TABLES AND OTHER HEAVY MACHINERY.

The operating controller is small and compact and may be operated with exceptional ease as its contacts carry only a very small current (generally less than one ampere). The feature of easy operation is also a factor tending toward increased output, as the physical endurance of the operator has a direct influence when the mill table controller must be operated in many cases from two to three times per minute throughout the day. The acceleration of the motor is automatically effected and is entirely independent of the personal equation of the operator, and, as the cutting out of the starting resistance is interlocked with the current flowing to the motor, the acceleration may be set once for all and the accelerating current will never exceed the value corresponding to the setting of the controller. The motor therefore is not subjected to sudden peaks of load, and this has an immediate effect in heat reduction in the motor and lessened strain of the generating machinery. The controller itself from the standpoint of repairs has marked advantages. The welding and burning of contacts, and the grounding of resistance due to heavy currents, and the high voltages which occur at the instant of reversal can be constant sources of

delay, trouble and repair. With the possibility of excessive current and high voltage entirely removed it is evident that the most fruitful causes of trouble are eliminated. There are also features in the new construction which add still further to its reliability. Chief among these is the fact that all of the heavy currents are handled by magnetically operated switches while only very small currents for operating these switches are carried by the moving contacts on the operating controller. This prevents arcing as the rapidity of closing and opening the circuits carrying heavy currents does not follow the relatively slow motion of the operator's hand. In opening, the magnetic switches act instantly with wide separation of contacts, thus preventing the arcing so destructive to slowly operated mechanism under heavy loads.

The apparent complication of this system is misleading when compared with the simple manner in which the connections may be traced out and verified at any time. Each of the magnetic switches, together with its terminals and the corresponding contacts on the operating controller, is plainly marked, and to check the connections or test the operation of any detail it is only necessary to place the operating controller on the point corresponding with the switch under investigation. All parts of the apparatus including the magnetic controller, the operating controller and the resistance are given a very liberal factor of safety both electrically and mechanically to fit them for the severe usage of steel mill service.

The illustration shows a controller embodying the above features and built for handling a 75-h. p. mill table motor in the Lackawanna Steel Co.'s plant at Buffalo.

The Electric Controller & Supply Co. is also building controllers of this kind for the Lorain Steel Co. and for the Illinois Steel Co. The Lorain controller is notable for the reason that it is to control two 100-h. p. motors connected in parallel.

Direct Motor Drives for Planers.

This system of control is a fully successful direct motor drive for planers or large shapers. The firm has a planer of this type on exhibition at St. Louis and which was illustrated in *The Iron Trade Review* of May 5. The description of the tests are here preceded by a brief mention of the features of the planer. The hand controller lever is moved by a pair of dogs adjustable to give any length of stroke. These dogs are slidably mounted in a T slot in the edge of the platen. A compound wound motor is direct connected to the planer cross shaft. The accelerating switches are mounted at the right of the motor with the necessary resistance behind the board. The reversing switch is at the left of the motor. This switch is regularly actuated by the dogs and has a handle operated from both sides of the machine by which the operator can juggle for position of the dogs in setting up and can stop the planer at any point of cut or on the return stroke. Above the motor are located the speed controllers by which the operator, without stopping the planer, adjusts the speed of cut and return stroke at will. This ready control of speed to suit various classes of work ensures time economy and puts the productive capacity of planers in the same category with motor driven lathes possessing variable speed control.

The speeds and cuts obtained on a 36x36 inch by 12-foot Pond planer are here given. The two voltage (110 and 220) system is used in this instance and the motor is a Westinghouse type S No. 7 frame of 6 and 12 h. p. The cutting speeds in feet per minute at 110 volts are 15, 20, 22½, 25, 28, 31, 33, 36, 39, 41, and 45, and at 220 volts are 35, 38, 43, 48, 52, 58, 63, 69, 73, 78, and 82. The corresponding return speeds in feet per minute are at 220 volts, 32, 38, 43, 47, 52, 58, 63, 69, 73, 78, and 82.

The speeds were measured with the cut-meter made by the Warner Instrument Co., of Beloit, Wis. Some representative cuts taken are as follows: In medium cast iron, 1⅝ inch deep by 3-32 inch feed at 50 feet per minute; in a .20 percent carbon Bessemer steel ingot, ½ inch deep by 3-32 inch feed at 47 feet per minute. These and heavier cuts at higher speeds which the tool steel would not stand, without sparking at the commutator. Strokes of 6 inches total length are easily obtained on this planer, and with a cutting speed at 40 feet and return at 80 feet, the platen reverses within 1-16 inch of a line.

This motor drive can be built for any direct current voltage as well as for any of the multiple voltage systems. It is manufactured under patent rights by the Electric Controller & Supply Co., of Cleveland. The engineers from representative steel plants at Chicago, Lorain, Pittsburg, Buffalo, etc., at the recent inspection of the apparatus as already reported in *The Iron Trade Review*, who witnessed or rather did the testing of the controllers did their best to beat the automatic features which are employed to safeguard the motor but without success. They expressed themselves satisfied that the vexed problem of rapid driving and reversing of heavy machinery with motors had been satisfactorily solved.

HAND CHAIN SHEAVES.

In the hand chain sheave shown in the illustration are embodied several features which recommend it. These sheaves are designed to operate with machine made twist link chain, the advantages being that machine made chain can be bought at about one-third the cost of straight link block chain, and the twisted links give an easier grip for the hands, enabling an operator to do a greater amount of work. The flanges are unusually large, so that it is seldom necessary to provide a guard to keep the chain from jumping the sheave.

The material used is a fine grade of gray cast iron, and though light the sheaves are amply strong to withstand ordinary shop wear. They are made in three sizes, 18, 24, and 36 inches diameter, but other sizes can be made up when desired.

A HAND CHAIN SHEAVE.

The bore and keyway can be made as desired, within a reasonable variation on the different sizes, but, unless otherwise ordered, the keyways are cut to standard dimensions. The sheaves are manufactured by the New Jersey Foundry & Machine Co., of New York.

The Wellman-Seaver-Morgan Co., of Cleveland, has just closed a contract with the Leiter Coal Co. for the construction and erection of a second hoisting plant at its mines at Zeigler, Ill. This plant will consist of a steel head frame, equipped with double cylinder hoisting engine and all the necessary guides, counterweights, etc. This is the second contract the Wellman-Seaver-Morgan Co. has taken for the Leiter Coal Co., the first consisting of a complete hoisting and coal handling plant, which is now in successful operation. The present contract was awarded on account of the Cleveland company's facilities for executing the work promptly.

The plant of the Ellington Machine Co., Quincy, Ill., was sold by foreclosure last week to the Ricker National Bank, of that city, for $33,900, which is the full amount of the claim of the bank against the property. The buildings alone cost $80,000 and the equipment $20,000 more. Several propositions looking toward the reopening of the plant have been considered, but no definite action has been taken.

GAS PRODUCTION AND TRANSMISSION.

The second report of the British Royal Commission on coal supplies contains some data on producer gas. This information was prepared by Prof. F. W. Burstall, M. Inst. C. E.

The systems of producing gas from coal may be subdivided into four main heads: (1) By heating in a retort—lighting gas. (2) By blowing air through the fuel, but not in sufficient quantities to complete combustion—Siemens' gas. (3) By blowing steam into incandescent coal—water gas. (4) By passing both air and steam through the fuel—producer gas. From the point of view of supplying the fuel for the purpose of both heating and power production the last method is the only practicable one. All the former are intermittent in their operation, with the exception of the Siemens, which produces a gas suitable only for metallurgical purposes. The ideal producer must be capable of supplying a clean, uniform gas continuously from fuel of an inferior quality, and must be free from the troubles due to caking, which is always found when burning bituminous coal. An important point in connection with the production of gas from coal is the recovery of the residuals. It is a well-known fact that if the temperature at which the gas is formed is not too high the producer gas will contain such a percentage of ammonia as to render the recovery of the residuals an important matter.

Taking the best known form—that of Dr. Mond—it may clear matters to describe the formation of gas from common bituminous coal or slack. The coal is filled into a dome-shaped vessel; it is here heated, and some of the gas is formed. This gas passes through the higher portion, and part of the tar is destroyed. The temperature of combustion is kept very low by means of the large quantity of steam blown in with the air. The object of this is to keep the temperature of combustion lower, and also it contributes to the formation of gas of regular composition. The hot gas on leaving the producer passes into a regenerator, where some of its heat is given to the incoming air and steam; from thence the gas passes to the washer, where any unburnt carbon is removed. If ammonia recovery is desirable, the gas is led through an acid tower, where it meets a solution of ammonia sulphate, together with a small proportion of free acid, the ammonia combining to form sulphate of ammonia; the gas then passes through the cooling tower and the air tower, and is now ready for use either in gas engines or for heating purposes. The composition of producer gas made by this method is:

1. Carbon monoxide .....11 percent
2. Hydrogen .....29 percent
3. Marsh gas ..... 2 percent
4. Carbon dioxide .....16 percent
5. Nitrogen .....42 percent

The calorific value is about 140 British thermal units per cubic foot—that is, about a quarter of the calorific value of lighting gas. The amount of gas produced per ton of slack varies, but is about 140,000 cubic feet per ton. The heating power of the gas, as compared with the original heating power of the coal, is about 84 percent, but it must be borne in mind that, whether for heating or power purposes, a fuel can be used much more economically in the gaseous form than in the solid.

The value of the ammonia sulphate recovered per ton of slack is about 4s. 6d. ($1.08), which represents about three-quarters of the cost price of the slack if the situation of generation is favorable. The ammonia recovery is, however, only financially possible when the plant is of a large size. The ideal case for the manufacture of producer gas is to place the installation as near as possible to the pit mouth, thus saving the carriage. The small and inferior coal could be gasified, while the larger and better quality of coal could be shipped to other districts. In general, however, we may assume that, except for the raising of coal, there will not exist in the neighborhood of the pit any considerable demand either for power or gas. It, therefore, became imperative either to turn the gas into electrical energy on the spot, and to transmit to those points where a demand for energy exists, or to transmit the gas itself in pipes.

In all questions connected with the distribution of power we have to consider the irregularities of demand during the day. The ratio of the average demand to the maximum capacity is termed the load factor, a quantity which varies from about 11 percent in the case of electric lighting to about 25 percent for combined electric lighting power, and tramways. As the capital sunk in mains, producers, etc., is independent of the fluctuation of the demand, it is clear that if by any means the load factor can be increased, the cost of energy could be diminished. An ideal method of effecting this would be to produce energy at a regular rate, and store the surplus during the times of light loads. At the present moment this is too costly, both for producer gas and electricity; the only real solution is to tap some new source where energy is required.

By far the largest consumption of coal is that used for heating, whether for manufacturing purposes or the warming of buildings; for this reason it is desirable, if possible, to transmit the producer gas itself into those neighborhoods where a demand exists, not only for lighting and power, but for heating; the obvious difficulty is, of course, the size of the mains. To transmit gas of such a low heating value, in such a manner as to be able to sell at prices which would compete with that of raw coal, it is necessary to use pressures in the gas mains very largely in excess of those used in lighting-gas mains; the question of leakage need not be a serious one if a properly designed joint be employed. Considerable experience on leakage from mains under pressure has been obtained from experiments on the air mains in Paris, where the pressure is about 100 pounds per square inch, and the length more than 20 miles. It was found that a leakage of less than 4 percent per mile could be obtained, and this, with a network comprising a comparatively large number of branches and valves to customers. I see no reason to doubt the fact that in long mains, with comparatively few branches and valves, the leakage could be reduced to less than one-tenth percent per mile. In the case of transmission, the only unavoidable loss is that due to friction, and this loss is extremely small if the velocities do not exceed about 50 feet per second. The very high efficiencies which could be obtained in transmitting air or gas do not seem to have received that attention which they deserve until recently.

I have calculated the power transmitted by a 48 inch main under different conditions of pressure and velocity (see table annexed). It has been assumed that 1 b. h. p. per hour can be obtained from 70 cubic feet of producer gas per hour; the power actually required for compressing the gas is also given. It will be noticed that for pressures up to about four atmospheres, that is, 44 pounds per square inch gauge pressures, and a moderate velocity of 30 feet per second, it is possible to obtain efficiencies above 87 percent with a transmission of 80 miles, the power transmitted by the main at full load being 75,000 horsepower; at lower loads, where the velocity is smaller, the efficiencies will be higher, as the loss in the main varies as the square of the velocity. These efficiencies are considerably better than those obtained from electrical transmission. The question of the capital cost of the gas mains as against those of the electric mains cannot be stated in general terms, as much depends on the particular locality, but there is no reason to consider that the cost will be greater than for a given amount of power transmitted electrically.

These figures show that gas transmission has an extremely high efficiency if the velocities can be kept down. I estimate that of the total gas produced, 60 percent would be used for heating. It is well known that the fluctuations in the demand for gas for heating purposes are much smaller than those for lighting and power. It is fair to assume, as the ratio of mean to maximum for this portion of the output would be 50 percent, that the load factor of the whole plant would be 30 percent for the heating gas, and the remaining 40 per cent would be used in gas-driven central stations producing 3-phase currents at pressures from 5,000 to 15,000 volts, according to the size of the districts which they had to cover. At these same stations the gas would be distributed at low pressures, so that no serious difficulty from leakage need be anticipated; the 3-phase current could be converted at suitable sub-stations into continuous current at 440 volts for use on trams and for lighting; part of the electric currents could be distributed for power purposes as 3-phase at pressures

of 500 volts. Taking the load factor for this part of the system at 25 percent, we have a load factor of 8 percent on the gas produced for electric purposes, making a total load factor for the gas plant of 38 percent.

The use of large gas engines for the generation of electricity is now only in its infancy, but it may be taken as quite certain that within a few years we shall see engines of from 4,000 to 5,000 horsepower capable of running with such regularity as to allow the alternators to be run in parallel. The economy of the large gas engine is undoubted. Taking the best steam engine as consuming 1½ pounds of coal per indicated horsepower hour, the coal being 15s. per ton, the cost in pence for a horsepower hour is 126d. In the gas engine, if the ammonia be recovered, the cost will be .008d., and if the ammonia is left in the gas it will be .032d. per horsepower hour.

The capital cost of gas driven and steam driven stations is rather in favor of the steam plant, but as the size increases the gas station will become cheaper per unit than the steam plant. Producer gas is particularly suitable for all manufacturing purposes where a temperature not exceeding 1,100 degrees centigrade is required; higher temperatures could, of course, be obtained by the aid of a regenerator. Amongst other purposes it may be employed for manufacturing steel, melting brass, brickmaking, in pottery manufacture, enameling, and in fact for any purpose where at present coal is employed. One of the minor advantages, but one which is important to the health of the inhabitants who live in the neighborhood of manufacturing centers, is the total absence of smoke, as the producer being closed cannot produce smoke, and during the combustion, whether in a gas engine or in a furnace, it is impossible to produce incomplete combustion. As the gas contains as much as 11 percent of the highly poisonous carbon monoxide, it may be considered as objectionable to risk gas under pressure, where a leak might prove fatal even in the open; as a matter of fact, ordinary lighting gas frequently contains a greater proportion of carbon monoxide, and this is frequently transmitted without the slightest trouble arising, although the joints are nowhere gastight. Modern engineering is certainly capable of producing a gas main in which the leakage should not be such as to give rise to any serious difficulties due to the poisonous nature of the gas. The most important argument to be urged in favor of the extended use of producer gas is that it can be manufactured as well from the large quantities of inferior coal which up to now have not been worked because they could not command a sale, and also because the valuable sulphate of ammonia is recovered and can be used as a fertilizer. The amount of ammonia which could be obtained from the coal raised in this country would be far more than sufficient to enable us to dispense with the importation of any kind of manure, while the use of gaseous fuel would very probably save from 30 to 50 percent of the total coal consumed in this country.

The table gives the length of transmission, horsepower transmitted, indicated horsepower required for compressing, and the efficiency for a gas transmission through a main 4 ft. diameter; 70 cub. ft. of gas per brake horsepower hour. Mechanical efficiency of compressor = .8, compression curve taken P. V. 1-3 = Constant.

Initial Pressure Absolute		Length of Transmission in Miles			Horsepower of Gas delivered by Mains			I.H.P. required to compress the Gas			Efficiency of Transmission. V=20 30, or 40
Lbs. sq. in.	Atmospheres	Initial Velocity in feet per sec. V. V=20	V=30	V=40	V=20	V=30	V=40	V=20	V=30	V=40	
15	1.02	7.66	3.4	1.92	13,130	19,200	26,260	30	44	60	99.7
15.4	1.05	18.6	8.2	4.65	13,550	19,800	27,100	65	95	130	99.5
16.2	1.1	34 5	15.3	8.6	14,150	20,700	28,300	116	171	2 3	99.2
17.6	1.2	61	27.1	15.2	15,500	22,600	31,000	273	399	545	98.2
22.0	1.5	133	59	33	19,300	28,350	38,750	780	1,120	1,535	96.2
29.4	2	150	66	37	28,850	37,820	51,600	1,780	2,610	3,565	93.4
44.1	3	178	79	44	38,750	56,700	77,500	4,500	6,596	9,000	89.6
58.8	4	182	83	46	51,650	75,500	103,200	7,780	11,400	15,550	87.0
73.5	5	191	85	48	64,600	94,600	129,100	11,550	16,910	23,100	84.9
88.2	6	194	86	48.5	77,500	113,500	155,000	15,890	23,290	31,875	83.0
102.9	7	196	87	48.9	90,300	132,000	180,700	20,630	34,560	41,370	81.5

"Manufacturer," who may be addressed in care of *The Iron Trade Review*, desires information concerning the dry galvanizing process known as Sherardizing.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of Their Wants:—

The Driggs-Peabody Ordnance Corporation has been organized at Sharon, Pa., for the purpose of manufacturing ordnance and the Driggs-Seabury semi-automatic guns. The company will be capitalized at $500,000. The site formerly occupied by the Kimberly rolling mill has been purchased and a steel structure 300 x 100 feet will be built. William B. Scaife & Sons, Pittsburg, have been awarded the contract for erecting the steel structure. The officers of the company are: John Stevenson Jr., president; Stephen Peabody, New York, vice president; Lewis Driggs, secretary; Thomas A. Harris, treasurer. The site for the buildings contains 16 acres.

The Fabrice de Carros y Fundicion Mexicana, S. A. (Mexican Car & Foundry Co.), which is to build an extensive plant in the vicinity of Mexico City to be devoted at first to the building of cars for steam roads, is about to place contracts in the United States for almost 100 machine tools of various descriptions.

The Gunnell Tool Co., Manitowoc, Wis., has been incorporated with a capital of $5,000. The incorporators are: Elias Gunnell, Lynford E. Geer and Charles C. West.

Cardwell Machine Co., 1900 East Cary street, Richmond, Va., is in the market for a 600 to 800-pound single-frame steam hammer, second hand.

The Acme Wire Co., Cuyahoga Falls, O., has been incorporated with a capital of $150,000. Incorporators are: Francis Seiberling, L. D. Brown, C. M. Brown, Fred E. Smith and S. H. Miller.

The W. L. Lutes Co., Chicago, has been incorporated with a capital of $10,000, to manufacture machinery. Incorporators are: Gideon F. Lanaghan, Walter H. Lutes and Jacob A. Barkey.

The Iowa Adjustable Gate Co., Des Moines, Ia., has been incorporated with a capital of $10,000. Incorporators are: G. W. Garvens, president, and R. C. Pickering, secretary and treasurer.

The Peerless Tube Co., Fisher's Island, Suffolk county, N. Y., has been incorporated with a capital of $25,000. Directors are: M. L. Stark, Lawrence Carrier and C. E. Watkins, of New York City.

The Benjamin Hobart Co., Whitman, Mass., has been incorporated with a capital of $25,000, to manufacture nails. Incorporators are: Benjamin Hobart, Artemas H. Hobart and F. H. McKenney

The Whitcomb & Paine Co., Boston, Mass., has been incorporated with a capital of $15,000, to manufacture machinery. Incorporators are: Lyman Spaulding, Herbert T. Maynard and Charles B. Whitcomb.

The Ideal Machine Co., Chicago, has been incorporated with a capital of $50,000 to manufacture machinery and tools. Incorporators are: E. D. Wheeler, F. Mahoney, Charles J. O'Connor.

P. H. MaGirl, of Bloomington, Ill., manufacturer of the mammoth tubular masonry furnaces, metal arch culverts and other specialties, has bought an air compressor and is in the

market for one or two air hoists. He would like catalogues and prices.

The Oil & Waste Saving Machine Co., Rochester, N. Y., has been incorporated with a capital of $50,000. Incorporators are: T. S. Patterson, Ed. H. Williams, C. F. Holcomb, Bridgeport, Conn.

The J. M. Mossman Co., New York, has been incorporated with a capital of $60,000 to manufacture combination locks. Incorporators are: J. M. Mossman, F. F. Keating and James Hopkins, New York.

The Brown-Talbot Machinery Co., Boston, Mass., has been incorporated with a capital of $50,000. Officers are: President, John Talbot, Dorchester, Mass.; treasurer, Dudley, Milton, Mass.; clerk, Edward Brown, Salem, Mass.

The Freeman Machine Co., New York, has been incorporated with a capital of $50,000. Directors are: W. H. Remington, T. L. Freeman, and T. A. Darby, New York.

Ernst Sachs, of the firm of Fichtel & Sachs, Schweinfurt, Germany, is now in the United States to place an order for automatic screw machines. He is making his headquarters with Schuchardt & Schutte, 120 Liberty street, New York.

The Western Can Machinery Co., Astoria, Ore., has been incorporated with a capital of $43,200. Incorporators are: John Eldridge, Peter Kruse, A. L. Fox and John Fox. The main office is to be in Astoria. The company will manufacture can making machinery.

The Ames Steel Lath Co., St. Louis, Mo., has been incorporated with a capital of $50,000. Incorporators are: Henry S. Ames, L. V. S. Ames, M. A. Cushman, A. S. Turner and Oscar Bradford.

The Gainesville Foundry and Machine Works, Gainesville, Fla., wants prices and circulars on machinery and equipment for foundry and machine shop, boilers, engines, etc.

Wyatt Furnace Manufacturing Co., Olmstead, Ky., wants to buy sheet steel, angle iron, light metal 28 to 32-inch wheels; also wants to correspond with manufacturers of sheet iron relative to making a patented device.

Dodge & Day, engineers, Philadelphia, have completed their plans and specifications for extension to the plant of the Victor Talking Machine Co. They contemplate the use of 600-h. p. horizontal tubular boilers, four units, each 18 feet long x 72 inches in diameter, with a working pressure of 125 pounds; two horizontal, automatic, high-speed engines, 160 and 240-h. p. respectively, direct-connected to 100-k. w. and 150-k. w. generators; fifteen electric motors ranging from 5-h. p. to 75-h. p., two elevators, heating system, fire, feed-water and vacuum pumps, switchboard and wiring, sprinkler system, water tanks, etc.

The C. A. Burton Machinery Co., Kansas City, Mo., has been incorporated with a capital of $25,000. Incorporators are: Clarence A. Burton, Joseph Roskill and David S. Davies of Kansas City.

The Crescent Machine Co., Detroit, Mich., has been incorporated with a capital of $65,000. Incorporators are: William A. Gray, John A. Gray, Frank J. Towar, Robert T. Teakle and George J. Playford.

The Waldron Flexible Engine Co., Camden, N. J., has been incorporated with a capital of $100,000. Incorporators are: Edward Waldron, Maurice A. Rogers, Charles A. Goldcraft. The company will manufacture and deal in rotary engines and pumps.

The Dopp Purification & Softening Co., capital $10,000, has been incorporated at Buffalo to manufacture apparatus and construct plants for the purification of water. The incorporators are: Wm. H. Dopp, Geo. H. Dunbar and Maurice B. Patch, all of Buffalo.

The New England Machinery Co., capital $4,000, has been incorporated at Buffalo to manufacture special woodworking machinery for office furniture. The incorporators are: John Meyer, Jesse Atherton and E. Meyer, all of Buffalo.

Fires and Accidents:—

Fire damaged the mill department of the American Rolling Mill Co., Middletown, O., July 30, to the amount of $15,000.

The work shop of the Missouri Valley Bridge & Iron Works, Leavenworth, Kas., was destroyed by fire on the night of July 30. Loss, $35,000; covered by insurance.

H. Dixon's foundry, Collingwood, Ont., was totally destroyed by fire July 29. The loss is estimated at about $8,000.

The pattern shops of the Maryland Steel Co., Sparrow's Point, Md., were burned Aug. 7, causing a loss of $40,000.

Fire on the night of Aug. 3 destroyed the lock plant of the Meyersdale Mfg. Co., Meyersdale, Pa., causing a loss of $5,000.

New Construction:—

Ground has been broken for the erection of the Humbolt Machine Shops, Humbolt, Tenn. The enterprise is promoted by Messrs. Allison, Hudson and Follis. It is expected that the plant will soon be in operation.

Plans for the new car shops of the Santa Fe railroad, at Albuquerque, N. M., to replace those recently destroyed by fire, call for buildings which will cost $23,000. There will be four buildings, the main structure being 200 x 90 ft.

The Jeffrey Mfg. Co., Columbus, O., has completed the plans for a new erection shop 125 x 254 ft. The roofing will be of corrugated iron and the building will be fireproof.

Menzel & Jeffery, Minneapolis, Minn., have moved into their new foundry, which has just been completed at a cost of $25,000.

The contract has been awarded for the construction of the new building for the American Wire Cloth Co., Clinton, Ia. The building will cost about $25,000.

The Bettendorf Metal Wheel Co., Springfield, O., has closed its plant to make important repairs and additions. The walls were damaged a short time ago by a wind storm.

P. B. Canfield has begun the erection, at Binghamton, N. Y., of a two-story plant for the manufacture of gas engines.

The Crompton & Thayer Loom Works, Worcester, has let the contract for an addition, 50 x 200 ft.

The Trinity & Brazos Valley Railroad Co. will erect a machine shop, 100 x 140 ft.; an engine house, 30 x 140 ft.; and a blacksmith shop, 24 x 40 ft., at Cleburne, Tex. The machinery is already ordered.

A car house and repair shop will be erected near Geneva, O., by the Cleveland, Painesville & Ashtabula Railway Co. Mrs. M. A. Phillips, Electric building, Cleveland, is purchasing agent for the company, which will buy an equipment of machine tools.

The new plant of the York Foundry & Machine Co., York, Pa., will be operated by Sept. 1. The building is of brick, 23 x 100 ft.

Work has been commenced on the new machine and blacksmith shops and car barns of the Coeur d'Alene & Spokane Railway at Coeur d'Alene, Idaho. The largest building will be 40 x 150 ft.

The Missouri Valley Bridge & Iron Works machine shops, Leavenworth, Kans., recently destroyed by fire, will be rebuilt. About 80 men were employed in the old plant and the new one will be large enough to employ 125. The works will be incorporated and nearly all of the stock will be retained by the estate of A. J. Tullock, who died July 21.

The Moffitt Iron Works Co., Raleigh, N. C., recently incorporated with a capital of $35,000, have begun the erection of a large brick building which will be used as a plant for the company.

Plans for the new shops of the Duluth & Iron Range railroad, to be built at Two Harbors, Minn., to replace buildings recently destroyed by fire, have been made with special reference to the use of machinery for the building and repairing of metal ore cars. When the shops were built, seventeen years ago, only wooden cars were manufactured, and the plant was never completely equipped with metal working machinery.

The Buckeye Engine & Foundry Co., Joliet, Ill., has completed its main plant, having a floor space of about 20,000 square feet. There is also a foundry and the company expects to add another building 40 x 100 ft. The company is now moving from Aurora, Ill. to Joliet and expects to be in full operation in its new quarters by August 20.

The Southern Wire & Iron Mfg. Co., recently incorporated with $40,000 capital, has erected a two-story brick factory and warehouse, and is installing machinery for the manufacture of office railings, fire-escapes, elevator enclosures, iron canopies, awnings, etc. H. A. Grove is president and general manager, and T. J. Letterlee, superintendent.

The Clare Furnace Co., Clare, Mich., has taken over the

entire business of H. B. Wells & Son and is beginning the erection of a permanent plant. The foundry and machinery of Wells & Son have been moved from Ithaca, Mich. to Clare.

Work has been commenced on the erection of the Braden Mfg. Co.'s plant at Terre Haute, Ind., which was formerly located at Petersburg, Ind., and was known as the Petersburg Galvanized Iron Co. The president of the company is W. A. Braden, and the principal stockholders are: George M. Bonert, J. H. Viche and W. E. Williams. The capital stock is $10,000. The first building to be erected will be 40 x 140 feet. The company expects to have its new plant in operation within three weeks.

The Higgins Spring & Axle Co., Racine, Wis., will build a plant 130 x 150 feet, as nearly fireproof as possible.

The new building for the Windsor Boiler Works, Windsor, Ont., will be of cement and will be ready for occupancy in two months. It will have a frontage of 130 feet and will be one story.

Extensive improvements are to be made to the Lansford shops of the Lehigh Valley Coal & Navigation Co. A number of new buildings and additions will be erected, the most important being a new power house and locomotive and machine shops.

General Industrial Notes:—

Hinkle furnace of the Ashland Iron & Steel Co., Ashland, Wis., has been blown out and will not resume until November. In the meantime the furnace will be relined, an additional stove will be put in and other improvements will be made.

The Youngstown Iron, Sheet & Tube Co., Youngstown, O., has decided to install a continuous furnace in its skelp mill department.

The Windsor Pump & Foundry Co., Windsor, Ont., recently incorporated, has elected the following officers: President, George McLeod; vice president, A. L. Thibodeau; secretary-treasurer, E. A. McCleary; manager, N. Beneteau.

Charles and Van Farquarson and W. Bowen, who have been connected with the Niles Boiler Co., Niles, O., until lately, have decided to start into business on their own account and are organizing a company which will be known as the Valley Plate & Sheet Iron Works, and which will manufacture sheet iron barrels to be used for oils, acids, paints, etc. A building has been rented and machinery ordered and it is expected that the company will commence operations within thirty days.

The Federal Electric Co. announces the removal of its offices and plant to Girard, Pa., where modern facilities and additional shop equipment will enable the company to greatly increase its output.

The plant of the Ellis & Lessig Iron & Steel Co., Pottstown, Pa., has been sold at public auction for $105,000. George N. Lessig, president and largest individual stockholder of the company, was the purchaser. The company will be reorganized and work resumed. The plant is equipped with plate and bar mills and nail machinery.

An order has been entered by Judge Grosscup at Chicago authorizing the receivers of the Union Traction Co. to purchase 100 new cars at a cost of $5,000 each. The new rolling stock will be delivered in Chicago within 60 days.

The Majestic Wire Fence Co., Ltd., of Detroit, Mich., now has a plant located in the heart of the city and on account of growing business finds that it will be necessary to move to a location where it can have more commodious quarters. The company has been considering Monroe, Mich., among other sites, but has not reached a definite decision.

The Lyons Metal Bound Shipping Crate Co., Lyons, N. Y., recently incorporaed, has rented a building and does not expect to erect a plant of its own this season.

The International Steam Pump Co. has secured a contract from Pedro Alvarado, known as the Mexican Silver King, for the complete electric pumping equipment of his extensive Parral mines. The contract calls for both station and sinking pumps of special high lift turbine type.

After two months' shut down the Columbus Malleable Iron Co., Columbus, O., has resumed operations. Some of the workmen had been idle since the beginning of the year.

The German-American Foundry Co., recently incorporated, will operate the foundry at Boonton, N. J., formerly operated by the New York Agricultural Co. The officers of the new concern are: Henry Krueger, president; John Sharkey, vice president; Oscar Rohland, treasurer; J. J. Cunningham, secretary and general manager. These officers formed a co-partnership last November, but the business increased and it was decided to incorporate. The company manufactures machinery castings, principally for rolling mills and blast furnaces.

The Federal Refractories Co., of which Joel H. Fuller, of Cleveland, is president and treasurer, has work well under way at its plant at Alexandria, Huntington Co., Pa. The office is finished, factory buildings nearly completed, as is also the tram road grading. Work on the kilns has been started and it is expected that brick will be made this year.

The Wellman-Seaver-Morgan Co., Cleveland, has just been awarded a contract to furnish the Wellman-Street cast steel truck bolsters for 800 cars to be built by the Norfolk and Western Railway Co., the whole order amounting to 550 tons of steel castings. Each bolster consists of one steel casting, having side bearing and center plates cast integral therewith, and will be made from basic open hearth steel. Of the 800 cars, 200 will be hopper coal cars of 50 tons capacity, having steel under-frames with wood lining, and will be built at the company's shops at Roanoke, Va. The remaining 600 cars will be box cars 40 tons capacity, having steel under-frames, and will be built by the American Car & Foundry Co., at Huntington, W. Va.

The steel plant of the National Tube Co. at Lorain, O., resumed operations Aug. 8, after being idle about two weeks. The two blast furnaces, which are banked a day or two later, resumed Aug. 7. Blast furnace No. 3 is almost completed, but the date for blowing it in has not been fixed. Excellent progress is being made in the building of the tube mills.

The car and machine shops of the Consolidated Railroad Co., Hartford, Conn., were vacated last week. The machinery has been shipped to New Haven and East Hartford, and the majority of employes have also gone to those two cities. The shops had been in operation 55 years. It is not announced what use will be made of the buildings.

The dismantling of the plant of the Empire Bridge Co., Albany, N. Y., a constituent concern of the American Bridge Co., is in progress. The machinery will be moved to the Buffalo plant of the American Bridge Co.

The British iron and steel firm of Dorman, Long & Co., of Middlesboro, has placed a large contract with the Chicago Pneumatic Tool Co. for air compressors, etc. and the necessary tools for operating its entire plant by means of compressed air.

The Kidder Machine Co., Manchester, N. H., has taken over the plant of Kidder & Whittier, who have done an extensive machine repairing business for the past six years. The members of the firm have been Jason Kidder and W. L. Whittier. Mr. Kidder was formerly connected with the Kidder Machine Co. Mr. Whittier will be general manager and Mr. Kidder will retire from active business.

The Reeves Mfg. Co., New Haven, Conn., manufacturer of clock and meter movements, spring motors, etc., has just increased its capital stock to $250,000, the purpose of the increase being to add the manufacture of gas meters to the present business. This company is one of New Haven's rapidly growing industries and has more than doubled its output during the past year. The officers of the company are: W. Reeves, president and E. A. Reeves, treasurer and general manager.

The recent fire in the plant of the Locke Regulator Co., Salem, Mass., destroyed the brass and iron foundries, but did not destroy the main works and will not delay the company to any great extent in filling orders.

The Chester Steel Casting Co., Chester, Pa., advises us that the recent fire in its plant was not of much importance and has not resulted in stopping the operation of the plant except for two days.

The Greer plant of the American Sheet & Tin Plate Co., New Castle, Pa., containing 20 mills, resumed operations this week after a month's idleness. The Shenango plant at the same place is operating twenty of its thirty mills.

W. R. Beatty, formerly general superintendent of the plant of the New Castle Forge & Belt Co., New Castle, Pa., has entered into partnership with William Ward, House building, Pittsburg, under the firm name of Beatty & Ward, machinery sales agents.

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It is a well known fact that where steam is used expansively more work can be done by dry steam than by steam containing moisture. The economy resulting from the use of dry steam obtained through a Cochrane Separator is of itself more than sufficient to pay the interest on the investment, and therefore, though your piping may be as well designed and so free from pockets that you do not anticipate large flushes of water, it will still be well worth your while to put in a Cochrane Separator for the sake of the steam economy and because you can obtain complete cylinder lubrication with less oil. Should you have reason to expect occasional flushes of water, because of overloading, foaming or priming, then of course the Cochrane Separator is an absolute necessity.

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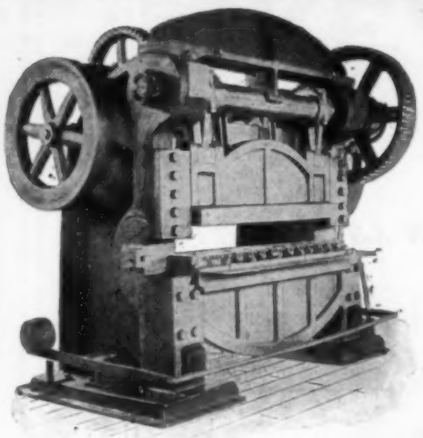

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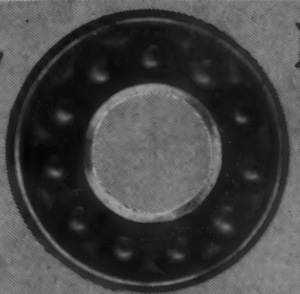

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NEW ORLEANS:	Hennen Building

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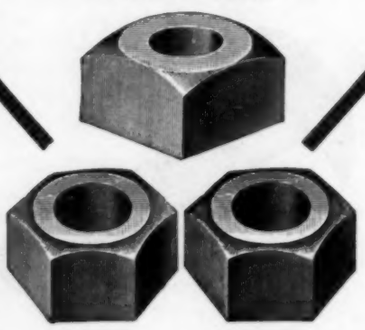

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